# PROCEDURES FOR HOME FREEZING OF VEGETABLES, FRUITS, AND PREPARED FOODS

## Classified notes on review of literature


AGRICULTURE HANDBOOK NO. 2

U.S. DEPARTMENT OF AGRICULTURE

# PROCEDURES FOR HOME FREEZING OF VEGETABLES, FRUITS, AND PREPARED FOODS

## Classified notes on review of literature

*by*

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## PURPOSE OF THE LITERATURE REVIEW

Freezing as a method of home food preservation has expanded rapidly during postwar years. Users of home freezers and freezer locker plants require sound information on methods for preparing, packaging, freezing, and storing a wide variety of foods and food products. While much information is available in the rapidly growing literature on frozen foods, recommendations reaching users of home freezers are often contradictory or lack adequate research basis. This is especially true in the area of frozen prepared and precooked foods, where insistent demand for information that is not available or complete emphasizes the need for continued research. For these reasons, the Bureau of Human Nutrition and Home Economics felt that a critical review of methods recommended for the preservation of foods by freezing and storage in home freezers and freezer locker plants would be of value in promoting uniformity in recommended procedures and directing further research into those areas where available information is incomplete or conflicting.

To make a critical evaluation of recommended procedures, the Bureau sponsored a Conference on Home Freezing, which was held March 14-17, 1949, in Washington, D. C., and attended by food-freezing specialists from institutions in various sections of the country. In preparation for this conference, several members of the Bureau staff collaborated in reviewing recent literature on food freezing. From the assembled information the following classified notes were developed to guide the conference discussions and serve as a working tool for use by conferees. Rapid exhaustion of the limited initial supply of mimeographed copies and continued demand for the notes indicated that a printed publication would be of value to those engaged both in research and in the dissemination of information on home-freezing methods.

## THE CLASSIFIED NOTES

The classified notes based on the literature review are arranged in four main sections. In the first section on vegetables and the second section on fruit, information is tabulated on: The preparation of the food, chemical treatment, heat treatment, cooling and type of pack recommended for freezing. In the third and fourth sections on prepared foods, information is tabulated on: Formula, preparation, packaging, freezing temperature, storage, thawing and heating for serving.

Within each section the procedures which the authors considered most applicable to home freezing are set apart in one column. Other procedures noted in the literature review are given in a separate column.

The authors wish to emphasize that the notes are not presented as a complete review of food-freezing literature. Publications reviewed were largely limited to those giving directions based on laboratory research or reporting concrete experimental data, and appearing within the last 10 years. To the extent that recent literature is covered, the presentation of the review in the classified notes, pages 3 - 95, serves certain functions not served by an annotated bibliography or the narrative review. The grouping of procedures from various sources provides for ready comparison of recommendations that have been made by different workers for the preparation of foods for freezing. It also emphasizes the incompleteness or conflict of information--which in turn indicates the need for further research.

### SELECTION OF PROCEDURES

The selection of procedures considered most applicable to home freezing was based not only on preponderance of opinion as expressed in available publications, but also on unpublished data in Bureau files, the authors' research experience, their evaluation of available information, and careful consideration of practical household usage.

In the category of preparation, lye peeling, which provides a rapid and economical method for peeling some fruits and vegetables, was not considered as a practical method for household use because of the difficulties involved in proper control of the process, and potential dangers involved in its use.

Among the chemical treatments, the use of calcium salts for the firming of some products, particularly frozen apples, which is being used successfully in commercial practice, was also considered to be a procedure that would be generally impractical for household use. Its successful application normally requires preliminary experimental testing to determine the concentrations and treatments required for particular varieties and stages of maturity, as well as more careful control than the average household worker is prepared to exercise.

While there is considerable variation in recommended procedures found in the literature, the authors believe that those listed as most applicable to home freezing of fruits and vegetables are generally suitable for the production of satisfactory frozen products. Information on the preparation and freezing of prepared and precooked foods is more limited and conflicting. In many instances there is reason to believe that the methods selected as most applicable do not result in products that are entirely satisfactory.

#### Preheating

Steam versus boiling water.--Directions are given in the notes for preheating both in steam and in boiling water. Preheating in boiling water

is in many cases considered the preferred method for household use because uniform contact with the heating medium can be readily attained and sufficient heat treatment to inactivate enzymes is fairly certain.

Preheating in a household steamer requires more attention to details of procedure to assure adequate heating of all portions of the vegetable or fruit. Unless fruits and vegetables are steamed in relatively thin layers, inferior frozen products may result because of insufficient preheating of central portions. However, since better retention of flavor and soluble nutrients is reported for some foods that are preheated in steam, this method was selected when reports indicated that steaming yielded satisfactory products.

Time-temperature relationships.--While reports in the literature give much attention to the problem of time-temperature relationships required for preheating different vegetables, recommendations vary considerably. Some of these variations are due to differences in methods of counting time. Though it did not seem feasible to include this detail in the outlines, in some cases preheating is timed from the moment of immersion of the prepared vegetable in boiling water. In other instances, time is counted when the water returns to boiling. With a specified heating time, the latter procedure provides for considerably more heat treatment than the former.

Proportion of water.--There was general agreement in the literature that the best proportion of vegetable to water to use is 1 pound of prepared vegetable to approximately 1 gallon of water. Therefore this information is not reported in the notes.

## Cooling

Essentially the same cooling procedure is recommended by all investigators. As soon as preheating is completed, the vegetable is plunged into cold running water having a temperature of 50° to 60° F. or into water to which ice has been added. Some vegetables that are mashed or pressed through a sieve are cooled in air or by floating the pan in cold water. References are not given for this step in the preparation of vegetables for freezing except where additional information is given.

## Varieties

The notes do not include specific recommendations as to varieties of fruits and vegetables and other factors such as maturity, although it is recognized that they are important to the quality of the frozen products. Because the varieties available and the quality of fruits and vegetables vary with the region in which they are grown, detailed information on selection for freezing should be sought from horticulturists and food-freezing specialists in local areas.

## Packaging

Only in the sections on prepared foods has information on packaging been included in the classified notes. The packaging requirements for most fruits and vegetables are very similar, the major prerequisite being that the package be moisture-vapor-proof. This publication does not attempt to evaluate the various types of packaging materials on the market.

## Storage

Where information was available on the storage life of frozen prepared foods it has been included in the outline. Time did not permit a review of the literature on storage life of frozen fruits and vegetables. However, the storage life of these products is generally longer than that of precooked foods. Most frozen fruits and vegetables, when properly prepared and packaged, are satisfactory during storage for 9 to 12 months at 0°F. or lower.

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Artichokes** | Preparation:<br>Pull off outside bracts and cut off tops of buds. Trim butt to a cone and submerge in water as quickly as possible. | |
| | Heat treatment:<br>Preheat in boiling water 7 minutes (75).[1/] | Heat treatment:<br>Preheat in boiling citric acid solution 7 minutes. Use 1 tablespoon citric acid or 1/2 cup lemon juice in 3 quarts water (148).<br>Preheat in 0.75-percent citric acid solution 7 minutes at boiling temperature (75). |
| | Cooling:<br>Cool in ice water or cold running water. | Cooling:<br>Cool in cold running water 5 minutes (148). |
| | Pack:<br>Pack dry, without brine (148). | |
| **Asparagus** | Preparation:<br>Sort according to thickness of stalk. Wash thoroughly. Cut or break off tender portion of stalk. Leave spears in lengths to fit the package or cut in 2-inch lengths. | |
| | Heat treatment:<br>Preheat in steam:<br>Small stalks--2 minutes (100,183).<br>Medium stalks--3 minutes (180,183).<br>Large stalks--4 minutes (100,183). | Heat treatment:<br>Preheat in steam:<br>Small stalks--<br>3 minutes (165).<br>3 1/2 minutes (130,148).<br>Medium stalks--4 minutes (167).<br>Large stalks--<br>4 1/2 minutes (130,148).<br>5 minutes (165,167).<br>No stalk size given--<br>2 to 3 minutes (171).<br>3 minutes (57).<br>3 1/2 minutes (87).<br>3 to 5 minutes (160). |
| | Preheat in boiling water (preferred):<br>Small stalks--2 minutes (54,100, 158,165).<br>Medium stalks--3 minutes (54,165, 167).<br>Large stalks--4 minutes (54,100, 148,158,165,167). | Preheat in boiling water:<br>Small stalks--<br>1 minute (171,180).<br>1 1/2 minutes (38).<br>3 minutes (130,148).<br>4 minutes at 92° C. or 3 minutes at 100° (74).<br>Medium stalks--2 minutes (38,180).<br>Large stalks--<br>3 minutes (38).<br>4 minutes (130).<br>No stalk size given--<br>2 1/2 minutes (117).<br>3 to 5 minutes (160).<br>Steam is preferred to boiling water (74,130).<br>No significant difference between steam and boiling water (158,180). |

See footnotes, page 95.

PROCEDURES FOR HOME FREEZING OF VEGETABLES--continued

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Asparagus-con. | Cooling:<br>Cool promptly in ice water or in cold running water. | Cooling:<br>Cool in cold water spray 3 to 4 minutes (57).<br>Cool in cold running water 3 to 5 minutes (148).<br>Place in iced water 60° F. or lower until cool to the tongue (158).<br>Cool in cold running water 4 minutes (130). |
| | Pack:<br>Pack dry, without brine (100, 148, 158, 160, 167, 171); or in 2-percent brine (54, 160). | Pack:<br>Brine packs in enamel-lined cans were unsatisfactory (165).<br>Freezing in brine had detrimental effect on flavor and texture (74). |
| Beans:<br>Lima | Preparation:<br>Shell, sort according to size, and wash. | |
| | | Chemical treatment:<br>Sodium chloride or alkali in blanching water increases color and palatability. Salts of iron, zinc, and aluminum are detrimental to color (186). |
| | Heat treatment:<br>Preheat in steam:<br>Small beans--2 minutes (130, 148, 171).<br>Medium beans--4 minutes (167).<br>Large beans--4 1/2 minutes (167). | Heat treatment:<br>Preheat in steam:<br>Small beans--<br>1 1/2 minutes (100).<br>1 to 2 minutes (171).<br>2 to 3 minutes for 6 months' storage (180).<br>3 minutes for 12 months' storage (180).<br>4 minutes (167).<br>Medium-sized beans--2 1/2 minutes (130, 148).<br>Large beans--<br>2 minutes (100).<br>3 minutes (130, 148). |
| | Preheat in boiling water (preferred):<br>Small beans--2 minutes (158).<br>Medium beans--3 minutes (167).<br>Large beans--4 minutes (87). | Preheat in boiling water:<br>Size of bean not given--<br>2 minutes (117).<br>2 to 3 minutes (160).<br>3 1/2 minutes (167).<br>Small beans--<br>1 minute (130, 148).<br>1 to 2 minutes (54).<br>1 1/2 minutes (100).<br>2 to 3 minutes for 6 months' storage (180).<br>3 minutes for 12 months' storage (180).<br>Medium-sized beans--<br>1 1/2 minutes (130, 148).<br>2 to 3 minutes (54).<br>3 minutes (167).<br>Large beans--<br>2 minutes (100, 130).<br>2 1/2 minutes (148).<br>3 minutes (158).<br>3 to 4 minutes (54).<br>3 1/2 minutes (167).<br>Unscalded beans are inedible (180).<br>Boiling water is preferred to steam (130. |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Beans - con.:** | | |
| Lima-con. | Cooling: | Cooling: |
| | Cool promptly in ice water. | Cool in cold running water 5 minutes (130,148). |
| | | Cool in ice water below 60° F. (158). |
| | Pack: | Pack: |
| | Pack dry, without brine (54,100, 158,160,167,171). | Pack dry or in brine (100). |
| | | Pack dry or in 2-percent brine (160). |
| | | No appreciable difference in dry and brine pack (85,167). |
| | | Cover with 2-percent brine if container is not moistureproof (54). |
| Shell, green | Preparation: | |
| | Shell beans. Do not wash them. | |
| | Heat treatment: | Heat treatment: |
| | Preheat in steam: | Steam blanching is preferred (148). |
| | 1 3/4 minutes (42,130,148). | |
| | Preheat in boiling water: | |
| | 1 minute (42,79,99,130,148). | |
| | Cooling: | |
| | Cool in cold running water about 3 minutes. | |
| | Pack: | Pack: |
| | Pack dry, without brine (79). | Pack dry or in brine (79). |
| Snap, green | Preparation: | |
| | Wash in cold water, then remove ends. Leave whole, slice lengthwise, or cut into 1- or 2-inch pieces. | |
| | Heat treatment: | Heat treatment: |
| | Preheat in steam: | Preheat in steam: |
| | 4 minutes (167). | 2 minutes (6,100,171). |
| | | 2 to 3 minutes (158,160). |
| | | 3 minutes (148). |
| | | 3 1/2 minutes (183). |
| | | 3 to 4 minutes (180). |
| | | 4 1/2 minutes (121). |
| | Preheat in boiling water: | Preheat in boiling water: |
| | 3 minutes (117,121,158,160,162, 167). | 2 minutes (47,54,79,116,148,158). |
| | | 2 to 3 minutes (158,160). |
| | | 4 to 4 1/2 minutes depending on maturity (70). |
| | | Preheat in steam under pressure: 1 minute (canned-bean flavor) (180). |
| | Cooling: | Cooling: |
| | Chill in cold water. | Cool in a minimum amount of cold water (180). |
| | | Cool in cold running water (100): |
| | | 2 minutes (116). |
| | | 3 minutes (121). |
| | | 3 to 5 minutes (148). |
| | Pack: | Pack: |
| | Pack dry, without brine (47,54,158, 160,167,171,180); or in 2-percent brine (54,160). | Brine pack has better texture (100). |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Beans-con.:** | | |
| Soybeans, green — | Preparation:<br>Squeeze beans out of pods after heating and cooling. Wash in cold water, and drain. | |
| | Heat treatment:<br>Heat in pods 5 minutes in steam (100), or in boiling water (38, 100,158,162,167). | Heat treatment:<br>Preheat in steam:<br>6 minutes in the pod (167).<br>Preheat in live steam:<br>4 to 6 minutes in the pod (180).<br>Prefer steam to boiling water (180).<br>Preheat in boiling water:<br>2 minutes in the pod (118).<br>3 minutes in the pod and 2 minutes after shelling (88).<br>3 or 4 minutes in the pod (180).<br>4 minutes in the pod (130,148).<br>5 minutes in the pod and 1 minute after shelling (165).<br>Preheat 1 minute in the pod; after shelling, 1 to 2 minutes for small, 2 to 3 for medium, and 3 to 4 minutes for large beans (54).<br>Blanching after shelling not needed (130). |
| | Cooling:<br>Cool pods in cold water. | Cooling:<br>Cool rapidly (88).<br>Cool for at least 5 minutes before shelling (130,148). |
| | Pack:<br>Pack dry, without brine (38,54,100, 158,167). | Pack:<br>Pack dry or in brine (38,100).<br>Cover with 2-percent brine if container is not moistureproof (54). |
| Wax---------- | Preparation:<br>Wash in cold water, then remove ends. Leave whole, slice lengthwise into strips, or cut into 1- or 2-inch pieces. | |
| | Heat treatment:<br>Preheat in steam:<br>Whole beans--3 1/2 minutes (130, 148).<br>Cut beans--3 minutes (130,148).<br>Strips--2 minutes (100,130,148).<br>Preheat in boiling water:<br>Whole beans--2 1/2 minutes (130, 148).<br>Cut beans--2 minutes (31,43,54,96, 100,130,137,148,160,163). | Heat treatment:<br>Preheat in steam:<br>Cut beans--<br>2 minutes (100).<br>2 1/2 minutes (163).<br>2 to 3 minutes (160).<br>Preheat in boiling water:<br>Whole beans--2 to 3 minutes (164).<br>Cut beans--2 to 3 minutes (31,43,54,160). |
| | Cooling:<br>Cool in cold running water. | Cooling:<br>Cool in cold running water:<br>3 to 5 minutes (148).<br>4 minutes (130). |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Beans - con.:** | Pack: | Pack: |
| Wax-con. | Pack dry or in brine (31,54,160, 164). | Pack dry or in 2-percent brine (31,54,160). Pack dry (43). |
| **Beet greens** ------ | Preparation: | |
| | Wash well. Remove tough stems and imperfect leaves. | |
| | Heat treatment: | Heat treatment: |
| | | Preheat in steam 3 minutes (130,148). |
| | | Preheating in steam not recommended (100). |
| | Preheat in boiling water: | Preheat in boiling water: |
| | 2 minutes (42,117,118,130,148,158). | 1 to 2 minutes (158). 1 1/2 minutes (100). |
| | Cooling: | Cooling: |
| | Cool in cold water. | Cool in cold running water 5 minutes (130,148). |
| | Pack: | |
| | Pack dry, without brine (100,118, 158). | |
| **Beets:** | | |
| Young ---------- | Preparation: | |
| | Wash, place in boiling water 1/2 minute. Peel, slice 1/4 inch thick or dice into quarter-inch cubes. | |
| | Heat treatment: | Heat treatment: |
| | | Preheat in steam: Slices or cubes--2 to 3 minutes (171). Whole, small--3 1/2 minutes (130,148, 163). |
| | | Steam preferred to boiling water (130). |
| | Preheat in boiling water: 2 1/2 minutes (40,96,99,130,148). | Preheat in boiling water: Slices or cubes--2 to 3 minutes (38,100). Whole, small-- 2 1/2 minutes (163). 3 to 4 minutes (100). 25 to 30 minutes (96,161). Whole, mature-40 to 50 minutes, until tender (42). |
| | Cooling: | Cooling: |
| | Cool in cold water. | Cool in cold running water 5 minutes (130,148). |
| | Pack: | Pack: |
| | Pack dry, without brine (38,160). | Pack dry or in 2-percent brine (160). |
| Mature ---------- | Preparation: | |
| | Wash and leave whole. Peel and slice after cooking. | |
| | Heat treatment: | |
| | Preheat in boiling water: | |
| | Cook until tender (40,42,99,118, 130,148,160,163,167). | |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Beets - con.:** Mature-con. | Cooling:<br>Cool in cold water:<br>Pack:<br>Pack dry, without brine (148,167). | |
| **Broccoli** ---------- | Preparation:<br>Wash, peel, and trim. Split lengthwise into pieces not more than 1 1/2 inches across.<br>Chemical treatment:<br>Soak in solution of 4 teaspoons salt to 1 gallon cold water 1/2 hour (158). | |
| | Heat treatment:<br>Preheat in steam:<br>5 minutes (40,45,158,163). | Heat treatment:<br>Preheat in steam:<br>3 to 3 1/2 minutes (100).<br>3 to 4 minutes (171).<br>3 to 5 minutes (163).<br>4 to 6 minutes, depending on size (148).<br>5 1/2 minutes (167). |
| | Preheat in boiling water:<br>3 minutes (38,54,100,160). | Preheat in boiling water:<br>3 to 3 1/2 minutes (100).<br>3 to 4 minutes (38,54,160).<br>4 minutes (38,45,54,142,158,160).<br>4 1/2 minutes (167).<br>3 to 5 minutes (40,79,148).<br>5 minutes (161).<br>Preheating in steam gave better product than preheating in boiling water (5). |
| | Cooling:<br>Cool promptly in cold water. | Cooling:<br>Cool in cold water 4 to 5 minutes (148). |
| | Pack:<br>Pack dry, without brine (38,100, 148,158,160,167,171). | Pack:<br>Pack dry or in brine (100).<br>Pack dry or in 1 1/2-percent brine (38).<br>Pack dry or in 2-percent brine (160).<br>Pack in 2-percent brine (54). |
| **Brussels sprouts** -- | Preparation:<br>Trim; remove outer coarse leaves. Wash thoroughly. Sort into small, medium, and large sizes. | |
| | Heat treatment·<br>Preheat in steam:<br>Small--3 minutes (100).<br>Medium--4 minutes (100).<br>Large--5 minutes (100). | Heat treatment:<br>Preheat in steam:<br>Axillary buds--2 or 3 minutes (171).<br>No size given--<br>3 to 4 minutes (163).<br>5 minutes (130,148).<br>Medium--5 1/2 minutes (167). |
| | Preheat in boiling water (preferred):<br>Small--3 minutes (38,100).<br>Medium--4 minutes (38,79,100).<br>Large--5 minutes (38,79,100). | Preheat in boiling water:<br>No size given--<br>3 to 4 minutes (163).<br>4 minutes (130, 148).<br>Medium--4 1/2 minutes (167).<br>Boiling water is preferable to steam (148). |

PROCEDURES FOR HOME FREEZING OF VEGETABLES--continued

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Brussels sprouts - con. | | Heat treatment:<br>Preheat in steam under 10 pounds pressure:<br>Axillary buds--1 minute (171). |
| | Cooling:<br>Cool promptly in cold water. | Cooling:<br>Cool in cold running water 8 minutes (130). |
| | Pack:<br>Pack dry, without brine (38, 100, 167). | Pack:<br>Pack dry or in brine (100).<br>Pack dry or in 1 1/2-percent brine (38). |
| Cabbage | Preparation:<br>Trim outer coarse leaves from head. Cut into medium to coarse shreds or wedges, or separate head into leaves. | |
| | Heat treatment:<br>Preheat in steam:<br>2 minutes (130,148).<br>Preheat in boiling water (preferred):<br>1 1/2 minutes (38,130,148). | Heat treatment:<br>Preheat in boiling water:<br>Cut sections--3 to 4 minutes (38).<br>Cook until tender (167). |
| | Cooling:<br>Cool in cold water. | Cooling:<br>Cool shredded cabbage 2 minutes (148).<br>Cool leaves in cold running water 3 minutes (148).<br>Cool in cold running water 2 to 3 minutes (130). |
| | Pack:<br>Pack dry, without brine (38). | Pack:<br>Pack dry or in 1 1/2-percent brine (38). |
| Cabbage, chinese | Preparation:<br>Wash, cut crosswise into 1-inch pieces. | Preparation:<br>Cut individual leaves from stem (146,148). |
| | Heat treatment:<br>Preheat in steam:<br>2 minutes (148).<br>Preheat in boiling water (preferred):<br>1 1/2 minutes (79). | Heat treatment:<br>Preheat in boiling water:<br>70 seconds (146,148). |
| | Cooling:<br>Cool in cold water. | Cooling:<br>Cool in 2-percent citric acid solution (79).<br>Cool in cold running water 5 minutes (148). |
| | Pack:<br>Pack dry, without brine (148). | |
| Carrots | Preparation:<br>Top, wash, peel.<br>Small tender carrots may be frozen whole; others cut into 1/4-inch cubes or thin slices, or frenched. | |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Carrots - con. ---- | Heat treatment:<br>Preheat in steam:<br>Frenched--2 minutes (130,148).<br>Diced or sliced--3 minutes (100, 130,147,148).<br>Whole, small--5 minutes (100).<br><br>Preheat in boiling water:<br>Frenched--2 minutes (130,148).<br>Diced or sliced--3 minutes (42, 100,130,142,148,165).<br>Whole, small--5 minutes (100).<br><br>Cooling:<br>Cool rapidly in cold water.<br><br>Pack.<br>Pack dry, without brine (12,54,100, 167,171). | Heat treatment:<br>Preheat in steam:<br>No size of piece given--2 or 3 minutes (171).<br>Diced or sliced--4 1/2 minutes (167).<br>Whole--4 1/2 minutes (130,147,148).<br>Steam recommended because water blanch removes much of the sugar content (12).<br>Preheat in boiling water:<br>No size of piece given--3 minutes (12,117, 160).<br>Diced or sliced--3 1/2 minutes (167), 2 to 3 minutes (54).<br>Whole--4 1/2 minutes (130,147,148), 4 minutes (142).<br>Boiling water preferred to steam (130,147,148).<br>Preheat in steam under 10 pounds pressure: 1 minute (171).<br>Cooling:<br>Cool in cold running water 5 minutes (130,147,148).<br>Pack:<br>Pack dry or in brine (100).<br>Pack dry or in 2-percent brine (54,160). |
| Cauliflower -------- | Preparation:<br>Break or cut into pieces about 1 inch across. Wash well.<br>Chemical treatment:<br>Soak in solution of 4 teaspoons salt to 1 gallon water 30 minutes (158).<br><br>Heat treatment:<br>Preheat in steam:<br>4 minutes (130,148,171).<br><br>Preheat in boiling water (preferred):<br>3 minutes (130,148,158). | Chemical treatment:<br>Dip in 4-percent sulfur dioxide solution for 2 minutes with no heat treatment, or add 0.125 to 0.150 percent sodium sulfite and 5 percent salt in the blanching water. Use 4 to 1 proportion of water to vegetable and boil 2 1/2 minutes (80).<br>Heat treatment:<br>Preheat in steam:<br>Sectioned heads--3 to 4 minutes (171).<br>Medium pieces--5 minutes (130,148,167).<br>Pieces 1/2 to 1 inch by 3/4 inch by 1 1/2 inches--5 minutes (121).<br>Preheat in boiling water:<br>Small pieces--2 1/2 minutes (100).<br>1-inch pieces--3 to 4 minutes (54,142,160).<br>Medium pieces--<br>3 1/2 minutes (100).<br>4 minutes (130,148,165,167).<br>Pieces 1/2 to 1 inch by 3/4 inch to 1 1/2 inches--4 minutes (121).<br>Preheat in steam under 10 pounds pressure:<br>2 minutes (171). |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Cauliflower - con.-- | Cooling:<br>Cool quickly in cold water.<br><br>Pack:<br>Pack dry, without brine (100,158, 160,167). | Cooling:<br>Cool in cold running water:<br>3 minutes (121).<br>4 to 5 minutes (148).<br>5 minutes (130).<br>Pack:<br>Pack dry or in brine (100).<br>Pack dry or in 2-percent brine (160).<br>Pack in 2-percent brine (54). |
| Celery---------- | Celery is not generally recommended for freezing. May be cooked and frozen for use in hot dishes (166). | Heat treatment:<br>Cook until tender, in steam or small amount of water (130,148).<br>Cooling:<br>Float pan containing vegetable in cold water, stirring frequently until cooled (148).<br>Cool 8 minutes (130).<br>Pack:<br>Pack dry (148). |
| Chard, swiss ------ | Preparation:<br>Wash thoroughly in cold running water.<br>Cut off large tough main stems.<br>Heat treatment:<br>Preheat in steam:<br>3 minutes (130,147,148).<br>Preheat in boiling water (preferred):<br>2 minutes (42,54,118,130,146,147, 148).<br><br>Cooling:<br>Cool in cold running water or in a large volume of cold water.<br>Pack:<br>Pack dry, without brine (54,160). | Heat treatment:<br>Preheat in boiling water:<br>1 1/2 minutes (100,161).<br>2 to 3 minutes (160).<br>Preferred to steam treatment (148).<br>Cooling:<br>Cool in cold running water 5 minutes (130,147,148). |
| Collards---------- | Preparation:<br>Trim and wash thoroughly in cold running water.<br>Heat treatment:<br>Preheat in steam:<br>3 minutes (130,148).<br>Preheat in boiling water (preferred):<br>2 minutes (130,137,148,160). | Heat treatment:<br>Preheat in boiling water:<br>1 1/2 minutes (38).<br>2 to 3 minutes (160). |

PROCEDURES FOR HOME FREEZING OF VEGETABLES--continued

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Collards - con. ---- | Cooling:<br>Cool in cold running water.<br><br>Pack:<br>Pack dry, without brine (38,160). | Cooling:<br>Cool in cold running water about 5 minutes (130,148). |
| Corn, sweet:<br>Whole-kernel ------ | Preparation:<br>Husk, remove silk, wash, and sort ears according to size. Cut kernels from cob after preheating. | |
| | Heat treatment: | Heat treatment:<br>Preheat in steam:<br>On the cob:<br>Small ears--6 1/2 minutes (130,148).<br>Medium ears--8 1/2 minutes (130,148).<br>Large ears--10 1/2 minutes (130,148).<br>No size given--<br>5 1/2 minutes (166).<br>7 1/2 minutes (87).<br>Cut from the cob--<br>1 to 2 minutes (171).<br>2 1/2 minutes (148).<br>5 minutes (167,180). |
| | Preheat in boiling water:<br>On the cob--4 1/2 minutes (166). | Preheat in boiling water:<br>On the cob:<br>Small ears--6 minutes (117,130,148).<br>Medium ears--8 minutes (130,148).<br>Large ears--<br>8 minutes (117).<br>10 minutes (130,148).<br>No size given--<br>2 minutes (38,117).<br>2 to 3 minutes (12).<br>3 minutes (100).<br>5 to 7 minutes (158).<br>Cut from cob:<br>4 minutes (167).<br>5 minutes (183).<br>Preheat in water at 160° F.:<br>Cut from cob--60 seconds (18).<br>Preheat in steam under 10 pounds pressure:<br>Cut from cob--4 minutes (171).<br>Prefer scalding on cob, then cutting corn (18,148,166,180,185).<br>Preferable to freeze cut corn rather than corn on cob (165).<br>No significant difference between steam and water scald; time required is different (165).<br>Live-steam scald is more desirable than water scald (180). |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Corn, sweet - con.:** | Cooling: | Cooling: |
| Whole-kernel-con. | Cool ears in cold water. | Cool cut corn in cold running water 5 minutes, corn on cob 10 to 15 minutes (148). |
| | | Cool 7 1/2 minutes in cold water (87). |
| | | Cool 15 minutes (130). |
| | Pack: | Pack: |
| | Pack dry, without brine (38,167). | No appreciable difference between dry and brine packs (35,165). |
| | | Brine pack superior in appearance and flavor (16). |
| On cob---------- | Preparation: | |
| | Husk, remove silk. Wash and sort ears according to size. | |
| | Heat treatment: | Heat treatment: |
| | Preheat in steam: | Preheat in steam: |
| | Small ears--7 minutes (100,167). | Small ears-- 6 1/2 minutes (130,148). 9 minutes (166). |
| | Medium ears--9 minutes (100,167). | Medium ears--8 1/2 minutes (130,148). |
| | Large ears--11 minutes (100). | Medium to large ears--12 minutes (166). |
| | | Large ears--10 1/2 minutes (130,148). |
| | Preheat in boiling water (preferred): | Preheat in boiling water: |
| | Small ears--7 minutes (38,100,158). | Small ears--6 minutes (130,148) 6 1/2 minutes (167), 8 minutes (166). |
| | Medium ears--9 minutes (38,100,158). | Medium ears--8 minutes (130,167). 8 1/2 minutes (148). |
| | Large ears--11 minutes (38,100,158). | Medium to large ears--12 minutes (166). |
| | | Large ears--10 minutes (130,148). |
| | | Preheat 6 to 8 minutes (12,171). |
| | | Preheat in live steam: |
| | | 10 minutes in live steam best for flavor but corn slightly sticky (180). |
| | | Preheat in steam under 10 pounds pressure: |
| | | 4 minutes (171). |
| | | At 190° F. the time required to inactivate the enzymes in center of cob overcooked the corn; 1/2-inch hole drilled through cob decreased blanching time by at least 2 minutes (15). |
| | Cooling: | Cooling: |
| | Cool in cold water. | Cool 10 to 15 minutes (148). |
| | | Cool 15 minutes (130). |
| | Pack: | Pack: |
| | Pack dry, without brine (167). | Wrap each ear individually (100,148). |
| **Eggplant**---------- | Preparation: | |
| | Wash, peel, cut into 1/3- to 1/2-inch slices or cubes. | |

PROCEDURES FOR HOME FREEZING OF VEGETABLES --continued

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Eggplant - con.** --- | Chemical treatment:<br>Lemon juice:<br>Dip in 3 teaspoons lemon juice per quart water. Dip again in lemon juice and water after heating and cooling (168). | |
| | Heat treatment:<br>Preheat in steam:<br>5 minutes (100,130,148). | Heat treatment:<br>Preheat in live steam:<br>2 to 3 minutes (171). |
| | Preheat in boiling water (preferred):<br>4 minutes (79,99,100,130,146,148, 160,163). | Preheat in boiling water:<br>3 to 4 minutes (160).<br>4 1/2 minutes, using 6 quarts water to 1 pound vegetable (168).<br>Boiling water preferred to steam blanch (130,148). |
| | Cooling:<br>Cool in cold running water. | Cooling:<br>Cool in 2-percent citric acid solution, then in cold water (99,146,148,163).<br>Rinse in solution of 4 1/2 teaspoons citric and ascorbic acid mixture to 1 quart water, then in cold water (163).<br>Cool 2 minutes in 2-percent citric acid solution, then 4 minutes in water (130). |
| | Pack:<br>Pack dry, without brine (100,160). | Pack:<br>Pack dry or in 2-percent brine (160). |
| **Kale** ---------- | Preparation:<br>Wash young succulent leaves in cold running water. Remove large tough main stems. | |
| | Heat treatment:<br>Preheat in steam:<br>2 minutes (148,171). | Heat treatment:<br>Preheat in live steam:<br>2 or 3 minutes (171). |
| | Preheat in boiling water (preferred):<br>2 minutes (45,118,137,160,163,170). | Preheat in boiling water:<br>1 to 2 minutes (45,158).<br>70 seconds (42,99,146,148).<br>1 1/2 minutes (38,100).<br>2 to 2 1/2 minutes (163).<br>2 to 3 minutes (160,170).<br>Boiling-water blanch preferred to steam blanch (42,148).<br>Preheat in steam under 10 pounds pressure:<br>1 minute (171). |
| | Cooling:<br>Cool in cold running water. | Cooling:<br>Cool in cold running water 5 minutes (148). |
| | Pack:<br>Pack dry, without brine (38,100, 160). | |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Kohlrabi | Preparation:<br>Cut off tops and roots; wash, peel, and dice in 1/2-inch cubes.<br>Heat treatment:<br>Preheat in boiling water:<br>1 minute (42,99,130,148).<br>Cooling:<br>Cool in cold water.<br>Pack:<br>Pack dry, without brine (54). | Heat treatment:<br>Preheat in steam:<br>1 2/3 minutes (99,148).<br>1 3/4 minutes (130).<br>2 to 3 minutes (54).<br>Steam-blanched samples were somewhat lacking in flavor (42).<br>Preheat in boiling water:<br>70 seconds (146).<br>2 minutes (118).<br>2 to 3 minutes (54).<br>Cooling:<br>Cool in cold running water 5 minutes (130,148).<br>Pack:<br>Pack dry or in 2-percent brine (54). |
| Mushrooms | Preparation:<br>Sort according to size. Wash thoroughly in cold water. Trim ends of stems and cut larger mushrooms into 4 or more pieces.<br>Chemical treatment:<br>Citric acid:<br>Before scalding dip 5 minutes in 1-percent by weight citric acid solution (26,167).<br>Heat treatment:<br>Preheat in steam (preferred):<br>Small, whole--3 1/2 minutes (146, 148).<br>Large, whole--5 minutes (112,146).<br>Slices--3 minutes (148).<br>Preheat in boiling water:<br>Small, whole--2 minutes (20,36,38, 39,163).<br>Large, whole--4 minutes (20,36,38, 39,112,148,163).<br>Slices--2 minutes (148). | Chemical treatment:<br>Lemon juice:<br>Before scalding dip 5 minutes in solution containing 1 teaspoon lemon juice per pint water (167).<br>Citric acid:<br>Before scalding dip 5 minutes in 1- or 2-percent citric acid solution (14).<br>Heat treatment:<br>Preheat in steam:<br>Cuts and buttons--2 1/4 minutes (14).<br>Small to medium, whole--5 minutes (167).<br>Medium and large--3 1/2 minutes (14).<br>Large--4 1/2 to 6 minutes (146,148).<br>Preheat in boiling water:<br>Small sizes and buttons--3 minutes (148, 161).<br>Small--<br>2 to 3 minutes (112).<br>3 minutes (146).<br>Medium size--5 minutes (161).<br>Large--4 to 5 1/2 minutes (146,148).<br>Larger sizes--<br>3 to 4 minutes (20,36,38,39,163).<br>4 minutes (112).<br>Depending on size--2 to 4 minutes (13,164). |

PROCEDURES FOR HOME FREEZING OF VEGETABLES--continued

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Mushrooms - con. | Cooling:<br>Cool in ice water or cold running water and drain.<br><br>Pack:<br>Pack dry, without brine (38,163, 167). | Cooling:<br>Cool in cold running water 2 minutes, then cool in 2-percent citric acid solution 2 minutes, and again cool in cold water 2 minutes. Drain 15 to 20 minutes (146,148).<br>Pack:<br>Dry or in light brine (112).<br>Dry or in 1 1/2-percent salt solution (38,163).<br>Use of 2-percent brine will improve the color (164).<br>Use of 2-percent brine makes texture more tender than dry pack (36,39).<br>Use of salt solution preferred (38). |
| Mustard greens | Preparation:<br>Wash young, tender leaves thoroughly in cold running water. Remove tough main stems.<br>Heat treatment:<br>Preheat in steam:<br>1 1/2 minutes (130,146,148).<br><br>Preheat in boiling water:<br>1 1/2 minutes (38,100).<br><br>Cooling:<br>Cool in cold running water.<br><br>Pack:<br>Pack dry, without brine (38,100,160). | Heat treatment:<br>Preheat in steam:<br>90 seconds (42).<br>Preheat in live steam:<br>2 to 3 minutes (171).<br>Preheat in boiling water:<br>3/4 minute (130).<br>50 seconds (42,146,148).<br>1 minute (99).<br>2 minutes (118).<br>2 to 3 minutes (160).<br>Preheat in steam under 10 pounds pressure:<br>1 minute (171).<br>Cooling:<br>Cool in cold running water 5 minutes (130,148). |
| Okra | Preparation:<br>Select young tender pods. Wash thoroughly, cut off stems so as not to rupture seed cells. Freeze whole or slice crosswise after scalding (79).<br>Heat treatment:<br>Preheat in steam:<br>Small pods--3 minutes (148,160).<br>Large pods--4 minutes (148,160). | Heat treatment:<br>Preheat in steam:<br>3 to 4 minutes (160). |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Okra-con. | Heat treatment-con.: | Heat treatment-con.: |
| | | Preheat in live steam: |
| | | 2 or 3 minutes (171). |
| | | Small pods--3 minutes (280). |
| | | Large pods--6 minutes (180). |
| | | Live steam is slightly superior to hot-water scald (180). |
| | Preheat in boiling water (preferred): | Preheat in boiling water: |
| | Small pods--2 minutes (79,148). | 2 to 3 minutes (79). |
| | Large pods--3 minutes (79,148). | 3 minutes (54). |
| | | 3 to 4 minutes (160). |
| | | Small pods--3 minutes (180). |
| | | Large pods--6 minutes (180). |
| | Cooling: | Cooling: |
| | Cool rapidly in cold water. | Cool in ice water (180). |
| | | Cool in running water 5 minutes (148). |
| | Pack: | Pack: |
| | Pack dry, without brine (54,148, 160). | Pack dry or in 2-percent brine (160). |
| Onions | Preparation: | |
| | Peel, wash, slice. | |
| | Heat treatment: | Heat treatment: |
| | Preheat in live steam: | Unscalded samples oxidized and turned brown, odor and flavor were strong, texture was tough (180). |
| | 3 minutes (180). | |
| | Cooling: | |
| | Cool in iced water. | |
| | Pack: | |
| | Pack dry, without salt (180). | |
| Parsnips | Preparation: | |
| | Top, wash, peel, cut in 1/2-inch cubes or lengthwise in slices 3/4 inch thick. | |
| | Heat treatment: | Heat treatment: |
| | Preheat in steam: | Preheat in steam: |
| | Cubes--3 minutes (12). | Cubes-- |
| | Slices--5 minutes (167). | 1 2/3 minutes (148). |
| | | 1 3/4 minutes (130). |
| | | Slices--3 minutes (130,148). |
| | | Steam preferred to boiling water (12,130). |
| | | Preheat in live steam: |
| | | Slices or cubes--2 to 3 minutes (171). |
| | Preheat in boiling water: | Preheat in boiling water: |
| | Cubes--2 minutes (54). | Cubes-- |
| | Slices--3 minutes (54). | 1 minute (130,148). |
| | | 2 to 3 minutes (54). |
| | | 5/8-inch cubes--3 minutes (118). |
| | | Slices-- |
| | | 2 minutes (130),148). |
| | | 2 to 3 minutes (54). |
| | | 4 minutes (167). |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Parsnips-con. | | Heat treatment-con.:<br>Preheat in steam under 10 pounds pressure:<br>1 minute (171). |
| | Cooling:<br>Cool rapidly in cold water. | Cooling:<br>Cool in cold running water 5 minutes (130,148). |
| | Pack:<br>Pack dry, without brine (12,54,167). | Pack:<br>Pack dry or in 2-percent brine (54). |
| Peas: | | |
| Field (blackeye) | Preparation:<br>Shell peas, discarding those that are hard. Do not wash peas (148). | |
| | Heat treatment:<br>Preheat in steam:<br>3 minutes (148). | Heat treatment:<br>Preheat in live steam:<br>1 minute (171).<br>3 minutes for 1 year's storage (180). |
| | Preheat in boiling water (preferred):<br>2 minutes (148). | Preheat in boiling water:<br>1 minute (79).<br>3 minutes (180).<br>Boiling water preferred to steam (148).<br>Steam-pressure scalding gave a brownish overcooked product (180). |
| | Cooling:<br>Cool rapidly in cold water. | Cooling:<br>Cool in cold running water 5 minutes (148).<br>Cool thoroughly in ice water (180). |
| | Pack:<br>Pack dry, without brine (148). | |
| Green | Preparation:<br>Wash peas before or after shelling. Discard immature and tough peas. | |
| | Heat treatment:<br>Preheat in steam:<br>1 1/2 minutes (100). | Heat treatment:<br>Preheat in steam:<br>Small--1 1/2 minutes (130,148).<br>Medium to large--3 1/2 minutes (167).<br>Large--2 minutes (130,148).<br>All sizes--<br>1 minute (171).<br>2 minutes (52).<br>Less splitting of skins and less loss of solids at 190° F. than at 212° (68). |
| | Preheat in boiling water (preferred):<br>1 minute (4,5,38,45,52,117,158,162). | Preheat in boiling water:<br>Small--<br>45 seconds (130,148).<br>2 minutes (165).<br>Medium to large--2 1/2 minutes (165,167).<br>Large--1 minute (130,148).<br>Depending on size--1 to 3 minutes (12). |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Peas-con.:**<br>Green-con. | | Heat treatment-con.:<br>All sizes--1 1/2 minutes (100,107).<br>At 210° F. (99° C.)--30 seconds (34).<br>At 71° C.--2 minutes (better thiamine retention than at higher temperatures or for longer periods) (55).<br>At 190° F. --2 minutes (98).<br>At 80° or 85° C.--2 minutes (2).<br>Better to use temperatures slightly below boiling for 2 minutes than shorter periods in boiling water (77).<br>No difference with boiling water or at 188° to 200° F. (165).<br>Moderately long period below boiling (78).<br>No significant difference between water and steam blanching (55).<br>Overblanching produces texture and flavor changes that may be as objectionable as those resulting from underblanching (77).<br>Preheat in boiling water or steam:<br>Steam or water at 99° C. for 1 minute showed no difference in ascorbic acid content (144).<br>Steam or boiling water at 200° to 210° F. for 1 minute does not completely inactivate enzymes (37).<br>Boiling water preferred to steam (130). |
| | Cooling:<br>Cool rapidly in cold water. | Cooling:<br>Cool in cold running water 3 minutes (130,148,162).<br>Cool in running water 3 to 5 minutes (107). |
| | Pack:<br>Pack dry, without brine (12,38,100, 158). | Pack:<br>Pack dry or in brine (100).<br>Pack dry or in 1 1/2-percent salt solution (38).<br>Pack dry or in 2-percent brine (12).<br>Brine and dry packs were indistinguishable from each other in color, texture, and flavor, when cooked (103).<br>No appreciable difference in quality between dry and brine packs (165).<br>2 to 3 percent sugar added before freezing (28). |
| **Peppers, sweet** ---- | Preparation:<br>Wash, cut out stem, halve, remove seeds, slice if desired.<br>Heat treatment:<br>Blanching is not necessary but makes packing easier (38,100). | |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Peppers, sweet--con. | Heat treatment-con.<br>Preheat in steam:<br>Slices--3 minutes (148).<br>Halves--4 minutes (148).<br>Preheat in boiling water:<br>Slices--2 minutes (31,148,160).<br>Halves--3 minutes (31,148,160).<br>Cooling:<br>Chill promptly in cold water.<br>Pack:<br>Pack dry, without brine (100,167); or in brine (31,45,100,158,160). | Heat treatment:<br>Preheat in boiling water:<br>2 minutes (38,45,99,100,158,163).<br>2 to 3 minutes (31,160).<br>Do not scald (167).<br>Not necessary to scald peppers if cut fine (163).<br>Pack:<br>Pack in 1 1/2-percent brine (38).<br>Brine preferred to dry pack (160).<br>Pack in brine, using 1 teaspoon salt to 1 cup water (31,45,158,160). |
| Pimientos | Preparation:<br>Wash, remove seeds, and slice or cut as desired.<br>Heat treatment:<br>Preheating is not necessary but makes packing easier (38).<br>Preheat in steam:<br>2 minutes (38).<br>Preheat in boiling water:<br>2 minutes (38,45,100,158,160).<br>Cooling:<br>Cool promptly in cold water.<br>Pack:<br>Pack dry, without brine (100,160, 171); or in brine (38,45,100,158). | Heat treatment:<br>Preheat in live steam:<br>1 or 2 minutes (171).<br>Preheat in boiling water:<br>1 to 2 minutes (160).<br>Preheat in steam under 10 pounds pressure:<br>1 minute (171).<br>Pack:<br>Pack in 1 1/2-percent brine (38).<br>Pack in brine (1 teaspoon salt to 1 cup water) (45,158). |
| Potatoes | | Preparation:<br>For new potatoes:<br>Select potatoes the size of walnuts. Scrub them vigorously in cold water to remove skins, or wash and scrape them.<br>For french fries:<br>Use mature potatoes suitable for french frying. Wash, peel, and cut into sticks 1/3 inch square. |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Potatoes-con. | | Heat treatment:<br>Preheat in steam:<br>New potatoes--5 minutes (148).<br>Sticks--3 minutes (148).<br>Preheat in boiling water:<br>Sticks--2 minutes (148).<br>Cooling:<br>Cool in cold running water 3 to 5 minutes (148).<br>Pack:<br>Pack dry, without brine (148). |
| Pumpkin | Preparation:<br>Wash, cut into quarters or smaller pieces, and remove seeds. After preheating, remove pulp and mash or put through sieve.<br>Heat treatment:<br>Steam until soft (31,38,79,99,130, 148,160).<br>Cooling:<br>Cool in air.<br>Pack:<br>Pack dry, without brine (31,38,99, 100,171). | Heat treatment:<br>Steam until soft, 30 minutes (100).<br>Steam quarters or smaller pieces 30 to 45 minutes, depending on thickness of pieces (151).<br>Steam under 10 pounds pressure 10 minutes (171).<br>Cook until done in pressure cooker, mash, and sweeten to taste (79).<br>Cooling:<br>Float pan in cold running water (148).<br>Float pan in running water to cool 8 minutes (130). |
| Rutabagas:<br>Cubes | Preparation:<br>Cut off tops, wash, peel. Dice into 1/2-inch cubes.<br>Heat treatment:<br>Preheat in steam:<br>2 minutes (100).<br>Preheat in boiling water (preferred):<br>2 to 3 minutes (100).<br>Cooling:<br>Cool in cold running water. | Heat treatment:<br>Preheat in steam:<br>70 seconds (148).<br>1 1/4 minutes (130).<br>2 to 3 minutes (100).<br>Steam preferable to boiling water (148).<br>Preheat in boiling water:<br>1 minute (130,148).<br>Cooling:<br>Cool in cold running water 3 minutes (130,148). |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Rutabagas-con.:** | Pack: | |
| Cubes-con. | Pack dry, without brine (100). | |
| Puree | Preparation: | |
| | Cut off tops, wash, peel, cut in pieces, cook until tender, and press through a sieve. | |
| | Pack: | |
| | Pack dry, without brine (171). | |
| **Soybeans** | See Beans, page 6. | |
| **Spinach** | Preparation: | |
| | Use only young tender leaves. Remove large tough stems. Wash thoroughly in running water. | |
| | | Chemical treatment: |
| | | Sulfur dioxide: |
| | | Hold in 4-percent $SO_2$ solution for 2 minutes with no heat treatment (80). |
| | Heat treatment: | Heat treatment: |
| | Preheat in steam: | Preheat in steam: |
| | 3 1/2 minutes (130,148). | 1 to 2 minutes (171).<br>1 3/4 minutes (57).<br>4 minutes (167). |
| | Preheat in boiling water (preferred): | Preheat in boiling water: |
| | 1 1/2 minutes (38,100). | 1 minute (162).<br>1 to 2 minutes (171).<br>2 minutes for very tender leaves (165).<br>2 to 3 minutes (12,160).<br>2 1/2 minutes (87,130,148).<br>3 minutes (167).<br>3 minutes for more mature leaves (165). |
| | | Samples blanched 2 minutes at temperatures over 85° C. were satisfactory in color and flavor (2,77). |
| | | Agitate basket well during blanching (130). |
| | | Preheat 1 1/2 minutes with 0.125 to 0.150 percent sodium sulfite and .5 percent salt in blanching water (80). |
| | | Preheat in steam under 10 pounds pressure: |
| | | 1 minute (171). |
| | Cooling: | Cooling: |
| | Cool in cold running water. Drain and gently press out excess water (162). | Cool in cold running water:<br>3 minutes (148,162).<br>5 minutes (130). |
| | Pack: | |
| | Pack dry, without brine (38,100, 160,167,171). | |
| **Spinach, New Zealand** | Preparation: | |
| | Wash thoroughly in cold running water. Cut off large tough stems. | |

PROCEDURES FOR HOME FREEZING OF VEGETABLES--continued

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Spinach, New Zealand-con.** | Heat treatment:<br>Preheat in steam:<br>2 minutes (42,148).<br>Preheat in boiling water:<br>2 minutes (54,160).<br>Cooling:<br>Cool in cold running water or a large volume of cold water.<br>Pack:<br>Pack dry, without brine (54,160). | Heat treatment:<br>Preheat in boiling water:<br>70 seconds (42,148).<br>2 to 3 minutes (160).<br>Cooling:<br>Cool in cold running water 5 minutes (148).<br>Pack:<br>Pack dry or in 2-percent brine (54). |
| **Squash:** | | |
| Summer | Preparation:<br>Wash, cut in 1/2-inch slices. Cut Zucchini into 1/4-inch slices (38).<br>Heat treatment:<br>Preheat in steam:<br>5 minutes (167).<br>Preheat in boiling water:<br>4 minutes (38,100,160,167).<br>For Zucchini, 2 to 3 minutes (38).<br>Cooling:<br>Cool rapidly in cold water.<br>Pack:<br>Pack dry, without brine (38,100, 160,171). | Heat treatment:<br>Preheat in steam:<br>2 to 3 minutes (171).<br>3 to 4 minutes (160).<br>4 1/2 minutes (130,148).<br>Preheat in live steam:<br>1 3/4-minute scald in live steam gave negative tests immediately after processing and after 2 weeks' storage at 35° F. (180).<br>Preheat in boiling water:<br>3 to 4 minutes (38,100,160).<br>3 1/2 minutes (130,148).<br>Water preferred (130).<br>Preheat in steam under 10 pounds pressure:<br>1 minute (171).<br>Cooling:<br>Cool in cold running water about 5 minutes (130,148). |
| Winter | Preparation:<br>Wash, peel, cut into pieces, and remove seeds. After precooking, remove pulp and mash or press through a sieve.<br>Heat treatment:<br>Cook until soft (31,38,99,146,168). | Heat treatment:<br>Preheat in steam:<br>Until tender (130,148,162).<br>Until soft (30 minutes) (100).<br>Steam preferred (130). |

PROCEDURES FOR HOME FREEZING OF VEGETABLES--continued

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Squash-con.:** | | |
| Winter-con. | | Heat treatment-con.: |
| | | Preheat in boiling water: Until tender (148,162). |
| | | Bake until tender (99,168). |
| | | Preheat in steam under 10 pounds pressure: 5 minutes or less (168). |
| | Cooling: | Cooling: |
| | Cool in air. | Float pan in running water to cool (148). |
| | | Float pan in cold running water 8 minutes (130). |
| | Pack: | |
| | Pack dry, without brine (31,38,100). | |
| **Succotash** | Preparation: | |
| | Prepare corn and beans separately according to directions given for each vegetable. After preheating and cooling mix equal proportions of kernel corn and lima beans, soybeans, or snap beans (12,50, 148). | |
| | Heat treatment: | |
| | See Corn, page 12, and Beans, pages 4 through 6--Lima, Soybeans, or Snap. | |
| | Cooling: | |
| | See Beans and Corn. | |
| | Pack: | |
| | Pack dry, without brine (99,148). | |
| **Sweetpotatoes** | Preparation: | |
| | Grade according to size. Wash. Peel after cooking and pack whole, sliced, or mashed. | |
| | | Chemical treatment: |
| | | Citric acid or lemon juice: |
| | | Dip slices or whole potatoes for 5 seconds in solution containing 1 tablespoon citric acid or 1/2 cup lemon juice to 1 quart water (148). 0.2 to 0.4 percent (pH 5 or below) citric acid blended with the sugar and added to sweetpotatoes improved color and flavor. Use of lemon juice better than citric acid for flavor and texture (174,175). |
| | | After peeling, dip in solution of 1 part lemon juice to 8 parts water (79,168). |
| | Heat treatment: | Heat treatment: |
| | Cook until tender (148,163). | Steam in a pressure cooker at 10 pounds pressure 10 to 30 minutes according to size (168,171). |
| | | Bake until soft (168). |

PROCEDURES FOR HOME FREEZING OF VEGETABLES--continued

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Sweetpotatoes-con. | Cooling:<br>Allow to stand at room temperature until cool (148).<br>Pack:<br>Pack dry, without brine (171). | Pack:<br>Mix mashed sweetpotato with a little orange juice (163).<br>Add 15 percent sugar to improve product (174).<br>Roll slices in sugar, pack, freeze (79,168). |
| Tomatoes: | | |
| Whole, quarters, or slices | Not satisfactory as frozen product (130). | Preparation:<br>Wash firm, ripe, perfect tomatoes. Heat in steam or boiling water for 1 minute to aid in removal of skins (154).<br>Leave whole, quarter, or slice (163).<br>Slice and freeze tomatoes on trays (163).<br>Heat treatment:<br>Preheat in steam or boiling water:<br>2 minutes, then peel (147,148).<br>Preheat in live steam:<br>1 to 2 minutes (171).<br>Preheat in steam under 10 pounds pressure:<br>1 minute (171).<br>Blanching and cooling do not appear to be necessary (154).<br>Pack:<br>Pack dry, without brine (171).<br>Wrap whole in cellophane or aluminum foil before freezing (163).<br>Pack frozen slices in cartons (163).<br>Freezing:<br>Freeze rapidly, -20° or -30° F. (108) |
| Juice | Preparation:<br>Wash, sort, trim; crush or grind. Heat to boiling, express juice. Cool and pack. | Preparation:<br>Alternate process: Wash, sort, trim, crush, preheat to 150° F. to 175° F. Express juice, heat to boiling or to above 200° F. Cool (26).<br>Simmer quarters or eighths 5 to 10 minutes, drain juice, add 1 teaspoon salt to 1 quart juice (54).<br>Heat to 185° to 195°F., press out juice and cool immediately. Add 2/3 to 1 percent salt for flavor (154).<br>Juice is more satisfactory than sectioned tomatoes (154). |

| Vegetable | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Turnip greens | Preparation:<br>Wash young tender leaves in cold running water. Cut off large tough stems. | |
| | Heat treatment:<br>Preheat in steam:<br>100 seconds (148). | Heat treatment:<br>Preheat in steam:<br>70 seconds (42).<br>1 3/4 minutes (130). |
| | Preheat in boiling water:<br>1 1/2 minutes (100). | Preheat in boiling water:<br>40 seconds (42).<br>60 seconds (99,130,146,148).<br>2 minutes (118,137).<br>2 to 3 minutes (160).<br>Boiling water preferred to steam blanch (148). |
| | Cooling:<br>Cool in cold running water. | Cooling:<br>Cool in cold running water 5 minutes (130,148). |
| | Pack:<br>Pack dry, without brine (100,160). | |
| Turnips | Preparation:<br>Wash, peel, and cut into 1/4- to 1/2-inch cubes. | |
| | Heat treatment:<br>Preheat in steam:<br>3 minutes (38,100). | Heat treatment:<br>Preheat in steam:<br>70 seconds (42,146,148).<br>1 1/4 minutes (130).<br>2 to 3 minutes (38,100).<br>3 minutes (12).<br>3 1/2 minutes (167).<br>Steam recommended, as water removes too much of the sugar (12). |
| | Preheat in boiling water (preferred):<br>2 minutes (38,54,100). | Preheat in boiling water:<br>60 seconds (42,130,148).<br>2 minutes (118).<br>2 to 3 minutes (38,54,100).<br>2 1/2 minutes (167).<br>Water-blanched product somewhat superior to steam-blanched (42). |
| | Cooling:<br>Cool in cold water. | Cooling:<br>Cool in cold running water 5 minutes (130,148). |
| | Pack:<br>Pack dry, without brine (38,54, 100). | Pack:<br>Pack dry or in 2-percent brine (54). |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Apples:** | | |
| Slices | Preparation:<br>Wash, peel, and core. Slice medium-sized apples into twelfths, large-sized into sixteenths.<br>Chemical treatment:<br>Ascorbic acid in sirup pack:<br>Add 1.5 gm. ascorbic acid per quart sirup to prevent darkening (158).<br>Ascorbic acid in sugar pack:<br>Add 1.2 gm. ascorbic acid per pound sugar. Dissolve in 1/4 cup water before adding to fruit (8).<br>Sodium chloride:<br>Hold in 1-percent salt solution (2 tablespoons salt in 1 gallon water) until used (44, 100, 148). | Chemical treatment:<br>Ascorbic acid in sirup pack:<br>Add ascorbic acid to sirup:<br>0.6 gm. per quart sirup (46).<br>1.5 to 2.3 gm. per quart sirup (158).<br>1.8 gm. per quart sirup (8).<br>0.114 percent of weight of apples in 37.5-percent sirup (94).<br>Ascorbic acid penetrated too slowly to be entirely satisfactory (119).<br>Sodium chloride:<br>Hold in 0.1-percent salt solution until used (119).<br>Hold in 0.1- to 1.0-percent salt solution until used (149).<br>Sodium sulfite or sulfur dioxide:<br>Hold slices 5 minutes in freshly mixed sodium sulfite solution (1 1/2 teaspoons sodium sulfite to 1 gallon cold water). Drain. Pack in 1 pound sugar to 5 or 6 pounds fruit (168).<br>Hold slices 5 minutes in solution of 500 p.p.m. $SO_2$ and 0.1 percent $CaCL_2$ with pH adjusted to 2.7 to 2.9. Drain. Hold 6 hours before freezing (44).<br>Hold 2 minutes in solution of 2,800 to 3,000 p.p.m. $SO_2$. Drain 1 hour, then sweeten. Hold 3 to 4 hours before freezing (93, 94).<br>Calcium chloride:<br>Add calcium chloride:<br>0.1 percent to sirup (119).<br>0.03 to 1.5 percent to salt solution (119).<br>0.1 to 1.0 percent to water used for preheating (119).<br>0.5 percent to water in which apples are blanched (81, 82).<br>0.5 percent to salt solution, rinse before blanching (82). |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Apples-con.:** | | |
| Slices-con. | | Chemical treatment-con.: |
| | | Hold fruit in calcium chloride solution: |
| | | 0.2- to 1.0-percent solution for 5 minutes (61). |
| | | 0.5- to 1.0-percent solution for 30 minutes; rinse (81, 82). |
| | | 0.5- to 1.0-percent solution for 2 to 20 minutes after blanching (149). |
| | | As apples ripen, more calcium is required for firming (61). |
| | Heat treatment (for pie slices): | Heat treatment: |
| | Steam slices 1 1/2 to 2 minutes (148, 158). | Preheat in steam: |
| | Cool in ice water (148). | 1 minute (148). |
| | | 1 1/2 minutes (61). |
| | | 1 1/2 to 2 minutes (149). |
| | | 2 to 3 minutes (38). |
| | | 3 to 4 minutes (100). |
| | | Preheat in boiling water: |
| | | 1 1/2 minutes (148). |
| | | 1 1/2 to 2 minutes (158). |
| | | 1 1/2 to 3 minutes (38). |
| | | 3 to 4 minutes (100). |
| | | Preheat in light sirup: |
| | | 1 1/2 to 3 minutes (38). |
| | Pack: | Pack: |
| | Sugarless pack: | |
| | Pack dry. Add no sugar or sirup (100, 148). (For steamed or sulfited apples only.) | |
| | Sirup pack: | Sirup pack: |
| | Slice directly into 25- to 50-percent sirup, depending on tartness of fruit. Press fruit down and use enough sirup to cover (158). | Concentration of sirup recommended: |
| | | 25-percent.[2/] |
| | | 33 1/3-percent (119). |
| | | 40- to 50-percent (158). |
| | | 50-percent (100). |
| | | 60-percent (8). |
| | Sugar pack: | Sugar pack: |
| | Sprinkle 1 pound sugar evenly over 5 pounds fruit. Allow to stand a few minutes, then stir carefully until each slice is coated (8, 167). | Proportion of sugar to fruit by weight recommended: |
| | | 1 to 3, or 1 to 4 (158). |
| | | 1 to 3 (100). |
| Juice---------- | Preparation: | |
| | Wash fruit, crush, press out juice (56, 166). | |
| | Chemical treatment: | Chemical treatment: |
| | Ascorbic acid: | Addition of enzyme preparation clarifies juice (166). |
| | Add 1 1/2 teaspoons per 3 gallons of juice (166). | |

See footnotes, page 95.

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Apples-con.: | | |
| Juice-con. | | Heat treatment:<br>Heat juice promptly and rapidly to 170° to 175° F. in the upper part of a double boiler (166). Flash pasteurizing and vacuumizing preserved rich fresh flavor and white color (30). |
| Applesauce | Core and slice apples. Add 1/3 cup water to each quart apples. Cook until tender. Cool and strain. Sweeten to taste. 2/ | Use 1/2 to 3/4 cup sugar to 5 cups sauce (148).<br>Mix 1 pound sugar with 10 or 12 pounds fruit after cooking (168). |
| Apricots: | | |
| Halves and slices | Preparation:<br>Sort, wash, halve, and pit. Peel and slice if desired. | |
| | Chemical treatment: | Chemical treatment: |
| | Ascorbic acid in sirup pack:<br>Add 1.5 gm. ascorbic acid per quart sirup (equals 250 mg. per pint finished pack) to prevent darkening (158). | Ascorbic acid in sirup pack:<br>Add ascorbic acid to sirup:<br>0.3 gm. (0.03 percent) per quart sirup (29).<br>0.1 percent per quart sirup for equal weights of apricot halves and sirup or for 11 ounces sliced fruit and 5 ounces 40-percent sirup (66).<br>1.2 gm. per quart sirup (150 mg. per 4 ounces sirup and 12 ounces fruit) (62, 164).<br>1.5 to 2.3 gm. per quart sirup (1/4 teaspoon per 1 to 1 1/2 cups sirup) (158). |
| | Ascorbic acid in sugar pack:<br>Use 1.2 gm. ascorbic acid per pound sugar used (equals 185 mg. per pint finished pack). Dissolve ascorbic acid in 1/4 cup water before adding to sugar (62). | Ascorbic acid in sugar pack:<br>Use 185 mg. ascorbic acid per pound finished pack of 1 part sugar to 5 parts fruit (62). |
| | Sulfur dioxide (for apricots for pie):<br>Immerse halves in 0.4-percent sulfur dioxide solution for 3 minutes. Drain. Pack in sirup or sugar (76). | Sulfur dioxide:<br>Use 100 p.p.m. $SO_2$ in 40-percent sirup (29).<br>Citric acid:<br>Hold 1 to 2 minutes in solution of 1/4 teaspoon citric acid in 1 quart water before packing in sugar or sirup (158). |
| | | Heat treatment:<br>Preheat in steam:<br>3 to 4 minutes (73, 100).<br>Until heated through (72, 100).<br>Preheat in boiling water:<br>1/2 minute (165).<br>3 to 4 minutes (100). |

See footnotes, page 95.



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| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Apricots-con.:** | | Heat treatment-con.: |
| Halves and slices-con. | | Preheat for 3 minutes in 15- to 25-percent sugar sirup at near boiling temperature (72). |
| | | Preheating imparts cooked flavor (73). |
| | | Water cooling causes loss of soluble solids (73). |
| | Pack: | Pack: |
| | Sirup pack: | Sirup pack: |
| | Cover with 40-percent sirup (66, 158). | Concentration of sirup recommended: |
| | | 15- to 25-percent (72). |
| | | 40- to 50-percent (158). |
| | | 60- to 70-percent (148). |
| | | 1 part sugar dissolved in cold water (15 cups sugar per gallon water) to 4 parts fruit (165). |
| | Sugar pack: | Sugar pack: |
| | Mix 1 pound sugar with 3 or 4 pounds fruit. Stir gently until sugar is partly dissolved, and pack (100, 158). | Proportion sugar to fruit by weight recommended: |
| | | 1 to 2, or 1 to 3 (72). |
| | | 1 to 3, 1 to 4, or 1 to 5 (100). |
| | | 1 to 4 (165). |
| | | 1 to 5 (62). |
| Crushed---------- | Preparation: | |
| | Peel, pit, and coarsely crush apricots. | |
| | Pack: | Pack: |
| | Sugar pack: | Sugar pack: |
| | Thoroughly mix 1 pound sugar with each 5 pounds fruit (76). | Use 1 pound sugar to 3 pounds fruit (38). |
| Puree---------- | Preparation: | |
| | Pit, then press soft-ripe fruit through a sieve (76). | |
| | | Chemical treatment: |
| | | Ascorbic acid: |
| | | Use 0.02 to 0.03 percent by weight (76). |
| | | Citric acid: |
| | | Use 0.5 percent (76). |
| | | Heat treatment: |
| | | Heat apricot quarters to boiling point in just enough water to prevent scorching. Cool, press through sieve (148). |
| | Pack: | Pack: |
| | | Sirup pack: |
| | | Sweeten with heavy sirup (76). |
| | | For dessert puree: Use equal volumes of 50-percent sirup and fruit puree (132). |
| | Sugar pack: | Sugar pack: |
| | Mix 1 pound sugar with each 4 pounds fruit puree (76). | Use 1 pound sugar to 3 pounds fruit puree (38). |
| | | Mix 2/3 cup sugar with each cup fruit puree (148). |

See footnotes, page 95.

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Avocados:** | | |
| Puree---------- | Preparation:<br>Peel, halve, and pit; mash pulp.<br>Chemical treatment:<br>Ascorbic acid:<br>Use 0.02 to 0.03 percent by weight (76).<br>Citric acid:<br>Use 0.5 percent (76).<br>Lemon juice:<br>Use 4 teaspoons lemon juice with pulp from two avocados (148).<br>Pack:<br>Sugar pack:<br>Mix 1 pound sugar with 4 pounds fruit puree (76). | Pack:<br>Sirup pack:<br>Sweeten with heavy sirup (76).<br>Sugar pack:<br>Use 3 tablespoons sugar with pulp from two avocados (148).<br>For ice cream: Use 1 pound sugar to 5 or 6 pounds fruit (76). |
| **Blackberries:** | | |
| Whole---------- | Preparation:<br>Sort, wash, and drain carefully.<br>Pack:<br>Sugarless pack:<br>Pack without sugar or sirup (158).<br>Sirup pack:<br>Cover with 40- to 50-percent sirup (38, 100, 112, 158).<br>Sugar pack (for pie or jam):<br>Add sugar in proportion of 1 pound sugar to 4 pounds fruit (38, 158). | Pack:<br>Sirup pack:<br>Concentration of sirup recommended:<br>50- to 60-percent (148).<br>Sugar pack:<br>Proportion of sugar to fruit by weight recommended:<br>1 to 4 (112).<br>1 to 4 (158).<br>1 to 4, or 1 to 5 (38).<br>Freezing temperature:<br>The rate of freezing needs to be only great enough to prevent fermentation (60). The lower limit of freezing velocity is 2.5 to 3 mm. per hour (60). |
| Crushed---------- | Sugar pack:<br>Add 1 pound sugar to 3 pounds berries; stir until sugar is well dissolved (100). | |
| Puree---------- | Preparation:<br>Sieve washed berries. | |

PROCEDURES FOR HOME FREEZING OF FRUITS--continued

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Blackberries-con.:** | | Chemical treatment: |
| Puree-con. | | Ascorbic acid: |
| | | Use 0.02 to 0.03 percent by weight (76). |
| | | Citric acid: |
| | | Use 0.5 percent (76). |
| | Pack: | Pack: |
| | | Sirup pack: |
| | | Use heavy sirup (76). |
| | | For dessert puree: Use 1 part 67-percent sirup to 3 parts by volume of blackberries (132). |
| | Sugar pack: | Sugar pack: |
| | Mix 1 pound sugar with 4 pounds puree (76). | Proportion of sugar to fruit by weight recommended: |
| | | 1 to 3 (38, 100). |
| | | 1 to 5, or 1 to 6 for ice cream (76). |
| **Blueberries:** | | |
| Whole---------- | Preparation: | |
| | Sort, wash, and drain. | |
| | Heat treatment: | Heat treatment: |
| | Preheat in steam 1 minute (173). | Preheat in 75-percent sirup 1/2 minute (173). |
| | Pack: | Pack: |
| | Sugarless pack (for preheated berries): | Sugarless pack: |
| | Pack dry, without sugar or sirup (100, 148, 158, 165, 167). | Dry pack develops off-flavor (83, 104). |
| | | Sugar pack superior in flavor (173). |
| | Sirup pack (preferred): | Sirup pack: |
| | Cover with 40-percent sirup (158, 165, 167). | Use 50-percent sirup (100,104). |
| | | Sugar pack: |
| | | Proportion of sugar to fruit by weight recommended: |
| | | 1 to 4 (158). |
| | | 1 to 5 (100,165, 167, 173). |
| | | 1 to 5, or 1 to 6 (148). |
| Crushed---------- | Sugar pack: | |
| | Mix 1 pound sugar with 3 pounds fruit (38). | |
| Puree---------- | Preparation: | |
| | Press fully ripe berries through fine sieve (83). | |
| | | Heat treatment: |
| | | Add 1/2 cup water for each 2 pounds crushed fruit. Heat to boil. Press through sieve (115). |
| | Pack: | Pack: |
| | Sugar pack: | Sugar pack: |
| | Blend with sugar to sweeten (83). | Add 2/3 cup sugar to 1 cup fruit puree (148). |
| | | Mix 1 cup sugar with 6 to 8 cups fruit puree (115). |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Boysenberries:** | | |
| Whole | Same as Blackberries, page 31. | Pack:<br>Sirup pack:<br>Concentration of sirup recommended:<br>45- to 50-percent (112). |
| Puree | Same as Blackberries, page 31. | Sirup pack:<br>For dessert puree: Use 1 part 67-percent sirup to 2 parts by volume of boysenberries (132). |
| **Cantaloups:** | | |
| Slices, cubes, balls | Preparation:<br>Cut in half, remove seeds, and peel. Cut in slices, cubes, or balls. | |
| | | Chemical treatment:<br>Ascorbic acid:<br>No advantage (76).<br>Sodium sulfite:<br>Sulfiting causes off-flavor (76).<br>Heat treatment:<br>Preheating causes off-flavor (76). |
| | Pack:<br>Sugarless pack:<br>Not recommended (148). | Pack:<br>Sugarless pack:<br>Freeze without sugar or sirup, with waxed paper between layers (38). |
| | Sirup pack:<br>Cover with 30-percent sugar sirup (76). | Sirup pack:<br>Concentration of sirup recommended:<br>30- to 40-percent (76).<br>40-percent (161). |
| | Sugar pack:<br>Mix with sugar, using 1 pound sugar to each 4 pounds fruit. Stir until sugar is partially dissolved, and pack (165). | Sugar pack:<br>Sugar pack develops off-flavors (76). Use 1 pound sugar to 5 pounds fruit (148, 167). |
| Crushed | Preparation:<br>Crush in food chopper, using coarse knife; mix thoroughly 1 pound sugar with 3 or 4 pounds fruit (38). | |
| **Cherries, sour** | Preparation:<br>Stem, sort, wash thoroughly, drain, and pit. | |
| For pie | Pack:<br>Sugar pack:<br>Add 1 pound sugar to each 4 pounds fruit (38, 76, 96, 100, 148, 158). | Pack:<br>Sugar pack:<br>Proportion of sugar to fruit by weight recommended:<br>1 to 3 (165).<br>1 to 3, or 1 to 4 (158).<br>1 to 3, 1 to 4, or 1 to 5 (38, 100).<br>1 to 4, or 1 to 5 (76, 148). |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cherries, sour-con.:** | Pack-con.: | Pack-con.: |
| For dessert ------ | Sirup pack: | Sirup pack: |
| | Cover fruit with 60- to 65-percent sirup (112). | Use 40- to 50-percent sirup containing 40 to 50 percent corn sirup (126). |
| Crushed ---------- | Sugar pack: | Sugar pack: |
| | Crush coarsely and add 1 pound sugar to 3 pounds fruit (38,100). | Add 1 pound sugar to 2 or 3 pounds fruit (38, 100). |
| Puree ---------- | Preparation: | |
| | Crush, heat to boiling point. Press through a sieve (115). | |
| | Pack: | |
| | Sugar pack: | |
| | Add 1 cup sugar to 6 cups fruit puree (115). | |
| Juice ---------- | Preparation: | |
| | Crush, heat just to boiling, and extract juice in jelly bag (148) | |
| | Pack: | Pack: |
| | Sugar pack: | Sugar pack: |
| | Freeze without added sugar or sweeten to taste (148). | Add 1 part sugar to 2 or 3 parts juice by weight (100). |
| **Cherries, sweet---** | Preparation: | |
| | Stem, sort, wash, and drain. | |
| Whole ---------- | Chemical treatment: | |
| | Ascorbic acid: | |
| | Add 1.5 gm. to each quart of cold sirup to prevent darkening of cherries (158). | |
| | Pack: | Pack: |
| | Sirup pack: | Sirup pack: |
| | Cover with 40-percent sirup (38, 100, 148, 158). | Cover with 40- to 50-percent sirup (38, 100, 148). |
| | | Cover with 40-percent sirup containing 40 to 50 percent corn sirup solids (126). |
| Pitted ---------- | Chemical treatment: | Chemical treatment: |
| | Ascorbic acid: | Ascorbic acid: |
| | Add 500 mg. ascorbic acid, dissolved in 2 tablespoons cold water, to each 3 pints fruit. Mix with fruit before adding sugar (96). | Use 0.25 percent dissolved in the sirup (76). Ascorbic acid of no advantage for Montmorency cherries (76). |
| | Pack: | Pack: |
| | Sirup pack: | Sirup pack: |
| | Pack in 40 or 50 percent sucrose sirup (38). | Use 40-percent sirup for Napoleon cherries (76). |
| | | Sugar pack: |
| **Crushed--------** | Sugar pack: | Add 1 pound sugar to each 4 pounds fruit (158). |
| | Add 1 pound sugar to each 3 pounds fruit (38). | |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cherries, sweet--con.:** | | Pack-con.: |
| Puree---------- | | Sugar pack: For dessert puree: Mix 1 part 67-percent sirup with 2 parts by volume of Montmorency cherry puree, or with 3 parts by volume of Bing cherry puree (132). |
| Juice---------- | Preparation: Crush, heat just to boiling, and extract juice in jelly bag (148). | |
| | Pack: | Pack: |
| | Sugar pack: Freeze without added sugar, or sweeten to taste (148). | Sugar pack: Add 1 part sugar to 3 parts juice (38). |
| **Cranberries:** | | |
| Whole---------- | Preparation: Stem and sort, discard imperfect and soft berries. Wash carefully and drain. | |
| | Pack: | |
| | Sugarless pack: Pack whole without sugar or sirup (38, 96, 148, 158, 167). | |
| | Sirup pack: Cover berries with 50-percent sirup (100, 158). | |
| | Sugar pack: Add 1 pound sugar to each 4 pounds fruit (158). | |
| Puree---------- | Preparation: Cook berries, press through a sieve (148). | |
| | Pack: | Pack: |
| | Sugar pack: Add sugar to taste. Cool (148). | Sugar pack: Use equal amounts of sugar and fruit (38, 100). |
| Sauce---------- | See Prepared and Cooked Foods, page 92. | |
| **Currants**---------- | Preparation: Wash in cold water. | |
| Whole---------- | Pack: | |
| | Sugar pack: Add 1 pound sugar to each 3 pounds fruit. Stir gently until partly dissolved (148). | |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Currants-con.:** | Pack-con.: | Pack: |
| Crushed | Sugar pack: | Sugar pack: |
| | Add 1 pound sugar to each 4 pounds crushed berries (167). | Add 1 pound sugar to 3 pounds fruit (99, 100). |
| Juice | Preparation: | |
| | Crush and heat berries slightly to start flow of juice. Press hot fruit in a jelly bag to extract juice. Cool (148). | |
| **Dewberries** | Same as Blackberries, page 31. | |
| **Elderberries** | Same as Blueberries, page 32. | |
| **Figs:** | | |
| Whole or slices-- | Preparation: | |
| | Wash, sort, and cut off stems. Peel; leave whole or slice. | |
| | | Chemical treatment: |
| | | Ascorbic acid: |
| | | Use 0.15 percent in sirup (64). |
| | | Sulfur dioxide: |
| | | Hold 2 to 3 minutes in 2,000 p.p.m. $SO_2$ solution for sliced fruit (64). Too little benefit to justify use for sirup pack (76). |
| | Pack: | Pack: |
| | | Sugarless pack: |
| | | Pack without sugar (100, 158). Sugarless pack not recommended (38). |
| | Sirup pack: | Sirup pack: |
| | Cover with 35-percent sirup (38, 64, 76). | Concentration of sirup recommended: 35- to 40-percent (25). 40- to 50-percent (100). 40-percent (158). 50- to 60-percent (148). 35-percent best, 20-percent causes flavor loss, 50-percent is too sweet and shrivels fruit (38). |
| | | Sugar pack: |
| | | Use 1 pound sugar to 4 pounds fruit (100, 158). Use 1 pound sugar to 5 or 6 pounds fruit (64). Sugar pack not recommended (38). More subject to oxidation than sirup pack (64). |
| Crushed | Preparation: | |
| | Crush or coarsely grind figs (64). | |
| | | Chemical treatment: |
| | | Sulfur dioxide: |
| | | Recommend 50 p.p.m. in fruit (64). |
| | Pack: | |
| | Sugar pack: | |
| | Add 1 pound sugar to 4 or 5 pounds fruit (64). | |

PROCEDURES FOR HOME FREEZING OF FRUITS--continued

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Figs-con.: | | |
| Puree | | Pack:<br>Sirup pack:<br>For dessert puree: Mix 1 part 67-percent sirup with 3 parts by volume Calimyrna fig puree (132). |
| Gooseberries | Preparation:<br>Sort, remove stems and blossom ends, and wash. | |
| Whole | Pack:<br>Sugarless pack (for use in pie):<br>Add no sugar or sirup (38, 96).<br>Sirup pack (preferred):<br>Cover with 50-percent sirup (54). | Pack:<br>Sirup pack:<br>Cover with 60-percent sirup (161).<br>Sugar pack:<br>Mix 1 pound sugar with 3 pounds fruit. Stir gently until enough juice is drawn from the berries to partly dissolve the sugar (100, 146, 148). |
| Grapefruit: | | |
| Sections | Preparation:<br>Wash and peel. Section, removing all membranes and seeds. | Chemical treatment:<br>Ascorbic acid:<br>Soak 15 minutes in aqueous solution containing 1 part ascorbic acid in 150 parts juice. Add 0.05 percent ascorbic acid to 5 ounces sirup and 11 ounces fruit (135). |
| | Pack:<br>Sirup pack:<br>Cover with 30- to 40-percent sirup made partly with excess juice (161). | Pack:<br>Sirup pack:<br>Concentration of sirup recommended:<br>20- to 30-percent (135).<br>25- to 30-percent (76).<br>30-percent for pink grapefruit (161).<br>40-percent for white grapefruit (161).<br>60- to 70-percent (148).<br>Pack in own juice for fresh fruit flavor (135). |
| Juice | Preparation:<br>Squeeze juice from fruit, trying to avoid any oil from rind (134). Handle rapidly and pack immediately (137). | Preparation:<br>Sweeten if desired (40, 148). |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Grapes:** | | |
| Whole | Preparation:<br>Wash and stem. Leave seedless grapes whole, cut Tokays in half and remove seeds.<br>Pack:<br>Sugarless pack:<br>Not recommended (38).<br>Sirup pack:<br>Cover with 40-percent sirup (38, 40, 161). | Pack:<br>Sugarless pack:<br>Sugarless pack not recommended except for native types used for juice pressing (38).<br>Whole Muscadine grapes may be packed dry without sugar (177).<br>Sirup pack:<br>Concentration of sirup recommended:<br>35- to 40-percent (38).<br>40- to 50-percent (40).<br>50-percent (146, 177).<br>Sugar pack:<br>Use 1 pound sugar to 5 pounds Muscadine grapes (177). |
| Puree | Preparation:<br>Wash, stem, and press through a sieve.<br>Chemical treatment:<br>Ascorbic acid:<br>Use 0.02 to 0.03 percent by weight with a 1 to 4 sugar pack (76).<br>Citric acid:<br>Use 0.5 percent with a 1 to 4 sugar pack (76). | Heat treatment:<br>Boil crushed grapes 2 minutes before pressing through sieve (115). |
| | Pack:<br>Sugar pack:<br>Mix 1 pound sugar with 4 pounds fruit puree (76). | Pack:<br>Sugarless pack:<br>Add no sugar or sirup (177).<br>Sirup pack:<br>Sweeten with heavy sirup (67-percent) (132).<br>Sugar pack:<br>Add 1 cup sugar to 8 cups puree (115).<br>For ice cream: Add 1 pound sugar to 5 or 6 pounds fruit puree (76). |
| Juice | Preparation:<br>Crush and heat grapes in top of double boiler to 140° to 145° F. Extract juice. Sweeten if desired (148).<br>Remove tartrate crystals by freezing, thawing, and straining juice (76, 148). | Preparation:<br>Boil crushed grapes 2 minutes. Pour off juice (115). |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Huckleberries** | Same as Blueberries, page 32. | |
| **Loganberries:** | | |
| Whole | Same as Blackberries, page 31. | Pack:<br>Sirup pack:<br>Concentration of sirup recommended:<br>55-percent (112).<br>Sugar pack:<br>Proportion of sugar to fruit by weight recommended:<br>1 to 3 (112). |
| Puree | Same as Blackberries, page 31. | Sirup pack:<br>For dessert puree: Use 1 part 67-percent sirup to 2 parts by volume of loganberries (132). |
| **Melons:** | | |
| Persian, Honeydew, Crenshaw | Same as Cantaloups, page 33. | |
| **Nectarines:** | | |
| Halves, quarters, slices | Preparation:<br>Sort, wash, pit, and peel if desired. Cut in halves, quarters, or slices.<br>Chemical treatment:<br>Ascorbic acid:<br>Put fruit directly into 40-percent sirup containing 1.12 gm. ascorbic acid per quart sirup (76).<br>Pack:<br>Sirup pack:<br>Cover immediately with 40-percent sirup (25, 76, 158). | Chemical treatment:<br>Ascorbic acid:<br>Add ascorbic acid to sirup:<br>1.5 to 2.3 gm. per quart sirup (158).<br>1.4 to 1.6 gm. per quart sirup (175 to 200 mg. for 12 ounces fruit plus 4 ounces sirup) (62).<br>Ascorbic acid plus citric acid:<br>Use 0.03 percent ascorbic acid plus 0.5 percent citric acid (76).<br>Citric acid:<br>Before packing, hold 1 or 2 minutes in solution of 1/4 teaspoon citric acid in 1 quart water (96, 158).<br>Pack:<br>Sirup pack:<br>Concentration of sirup recommended:<br>30- to 40-percent (76).<br>40- to 50-percent (25).<br>60- to 70-percent (148). |
| Puree | Same as Peaches, page 40. | |

PROCEDURES FOR HOME FREEZING OF FRUITS--continued

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Olives, ripe------- | Pack:<br>Wash pickling brine from olives and replace with fresh 2-percent brine (38), or pack freshly cured olives without brine (38, 76, 148). | Pack:<br>Cover with the liquid brine used in pickling (148).<br>Flavor and texture are better when brine is used (38). |
| Oranges: | | |
| Slices or sections | Preparation:<br>Wash and peel; slice, or section by removing membranes. | |
| | | Chemical treatment:<br>Ascorbic acid:<br>Add 0.05 percent ascorbic acid to sirup used in proportion of 5 ounces sirup to 11 ounces fruit (76). |
| | Pack:<br>Sirup pack:<br>Cover with own juice (76, 135). | Pack:<br>Sirup pack:<br>Concentration of sirup recommended:<br>20- to 30-percent (135).<br>40-percent (137).<br>60- to 70-percent (148). |
| Juice---------- | Preparation:<br>Squeeze juice from fruit, trying to avoid any oil from rind. Handle rapidly and pack immediately (137). | Preparation:<br>Sweeten if desired (40, 148). |
| Peaches: | | |
| Slices---------- | Preparation:<br>Wash, sort, pit, peel, and slice. | |
| | Chemical treatment:<br>Ascorbic acid in sirup pack:<br>Add 1.5 gm. ascorbic acid to each quart sirup (158). | Chemical treatment:<br>Ascorbic acid in sirup pack:<br>Add ascorbic acid to sirup:<br>0.672 gm. per quart sirup (46).<br>1.12 gm. (0.1 percent) per quart, 50-percent sirup (184).<br>1.5 gm. per quart sirup (3 teaspoons per gallon) (168).<br>1.5 gm. per quart 65-percent sirup (7).<br>1.5 to 2.3 gm. per quart 40-percent sirup (158).<br>2.0 gm. per quart 35-percent sirup (7).<br>2.8 gm. per quart 50-percent sirup (41). |
| | Ascorbic acid in sugar pack:<br>Add 0.8 gm. ascorbic acid, dissolved in 1/4 cup cold water, to each 4 pounds fruit and 1 pound sugar (7). | Ascorbic acid in sugar pack:<br>Use 0.575 gm. for 3 pints fruit (96).<br>Use 0.8 to 0.9 gm. ascorbic acid per pound sugar and 4 pounds fruit (7). |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Peaches-con.:** | Chemical treatment-con.: | Chemical treatment-con.: |
| Slices-con. | | Citric acid plus ascorbic acid: |
| | | 0.1 percent citric acid plus 0.05 percent ascorbic acid in 50-percent sirup as effective as 0.1 percent ascorbic acid (181, 184). |
| | | 0.5 percent (1.25 gm.) citric acid and 0.6 percent (150 mg.) ascorbic acid in 250 gm. 50-percent sirup not as good as 0.06 percent ascorbic acid alone (46). |
| | | Citric acid: |
| | | Dip for 1 or 2 minutes in solution of 1/4 teaspoon citric acid in 1 quart water [2] (158). |
| | | Use 1 1/3 ounces citric acid in 1 gallon of water (100). |
| | | Use 1 teaspoon lemon juice per pint of water (71). |
| | | Only moderately effective in sirup pack (168). |
| | Sodium sulfite (for peaches for pie or jam): | Sodium bisulfite: |
| | | Use not more than 1/2 teaspoon sodium bisulfite per gallon water (168). |
| | Immerse peeled halves in 0.4-percent sulfite solution for 3 minutes (76). | |
| | Pack: | Pack: |
| | Sirup pack: | Sirup pack: |
| | Put peaches directly into 40-percent sirup, using enough sirup to cover (7, 71, 158). | Concentration of sirup recommended: |
| | | 30- to 40-percent (71). 50-percent (17). |
| | | Use 50-percent for more acid varieties (24). |
| | | 45- to 65-percent sirup retards browning better than 35- to 45-percent sirup (7). |
| | | Sirup pack superior to dry sugar pack (125). |
| | | Peaches deteriorated more rapidly than berries (182). |
| | Sugar pack: | Sugar pack: |
| | Add 1 pound sugar to each 4 pounds fruit and mix well [2] (158). | Proportion of sugar to fruit recommended: |
| | | 1 to 3 (7). 1 to 3, or 1 to 4 (158). |
| Crushed ---------- | Sugar pack: | Sugar pack: |
| | Add 1 pound sugar to 4 pounds fruit (76). | Add 1 pound sugar to 3 pounds fruit (38, 100). |

See footnotes, page 95.

PROCEDURES FOR HOME FREEZING OF FRUITS--continued

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Peaches-con.:** | | |
| Puree---------- | Preparation:<br>Peel, halve, pit, and press through a sieve.<br>Chemical treatment:<br>Ascorbic acid:<br>Use 0.02 to 0.03 percent by weight (76).<br>Citric acid:<br>Use 0.5 percent (76). | Heat treatment:<br>Steam 7 minutes, before putting through sieve (115).<br>Heat peach quarters to boiling point in just enough water to prevent scorching. Put through a sieve (148). |
| | Pack:<br>Sugar pack:<br>Mix 1 pound sugar with 4 pounds fruit puree (76). | Pack:<br>Sirup pack:<br>Sweeten with heavy sirup (76).<br>Sugar pack:<br>Use 1 pound sugar to 3 pounds puree (38).<br>Add 1 cup sugar to 8 cups puree (115).<br>Add 2/3 cup sugar to 1 cup puree (148). |
| **Pears:** | | Pears not recommended for freezing (25). |
| Halves, quarters, slices. | Preparation:<br>Wash in cold water, peel, core, and cut in halves or quarters. Slice or dice if desired.<br>Chemical treatment:<br>Ascorbic acid:<br>Use 1.4 gm. to each quart cold sirup (62). | Chemical treatment:<br>Ascorbic acid:<br>Use 1.4 to 1.6 gm. per quart sirup (equals 175 to 200 mg. per pound pack of 12 ounces fruit and 4 ounces sirup) (62). |
| | Pack:<br>Sirup pack:<br>Cover immediately with 40- to 50-percent sirup (76). | Pack:<br>Sirup pack:<br>Concentration of sirup recommended:<br>30- to 40-percent (62).<br>60- to 70-percent (146). |
| Puree---------- | Preparation:<br>Press through sieve (76).<br>Chemical treatment:<br>Ascorbic acid:<br>Use 0.02 to 0.03 percent by weight (76).<br>Citric acid:<br>Use 0.5 percent (76). | |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pears-con.:** | Pack: | Pack: |
| Puree-con. ------ | | Sirup pack: |
| | | Sweeten with heavy sirup (76). |
| | | For dessert puree: Mix 1 part 67-percent sirup with 3 parts by volume of Beurre Hardy pear puree (132). |
| | Sugar pack: | Sugar pack: |
| | Mix 1 pound sugar with 4 pounds fruit puree (76). | For ice cream: Add 1 pound sugar to 5 or 6 pounds fruit puree (76). |
| **Persimmons:** | Not recommended except as puree (148). | |
| Puree ---------- | Preparation: | |
| | Sort, wash, and cut into sections. Press through a sieve (38, 76). | |
| | Chemical treatment: | |
| | Ascorbic acid: | |
| | Use 0.02 to 0.03 percent by weight (76). | |
| | Citric acid: | |
| | Use 0.5 percent (76). | |
| | Pack: | Pack: |
| | | Sirup pack: |
| | | For dessert puree use: Mix 1 cup 67-percent sirup with 4 cups fruit puree (76). |
| | Sugar pack: | Sugar pack: |
| | Thoroughly mix 1 pound sugar with 4 pounds fruit puree (38, 76). | Use 1 pound sugar to 4 or 5 pounds fruit puree (38). |
| | | For ice cream: Add 1 pound sugar to 5 or 6 pounds fruit puree (76). |
| **Pineapple** --------- | Preparation: | |
| | Pare, core, and remove other woody parts. Slice, dice, crush, or cut into wedges or sticks. | |
| | | Heat treatment: |
| | | Heat to boiling for about 3 minutes after mixing 1 pound sugar with 5 pounds fruit. Cool (29). |
| | Pack: | Pack: |
| | Sugarless pack: | |
| | Pack without sweetening, adding excess juice (76). | |
| | Sirup pack: | Sirup pack: |
| | Cover with 30- to 40-percent sirup (76, 118, 137, 161). | Concentration of sirup recommended: |
| | | 40-percent (137). |
| | | 50-percent (99). |
| | | 60- to 70-percent (148). |
| | Sugar pack: | Sugar pack: |
| | Mix 1 pound sugar with 4 pounds fruit (76, 99). | 1 pound sugar to 3 pounds fruit is too sweet (118). |

PROCEDURES FOR HOME FREEZING OF FRUITS--continued

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Plums, prunes:** | | |
| Halves or quarters | Preparation:<br>Sort, wash, halve or quarter, and pit fruit.<br>Chemical treatment:<br>Ascorbic acid in sirup pack:<br>Use 1.5 to 2.3 gm. ascorbic acid to each quart sirup (1/4 teaspoon to 1 to 1 1/2 cups sirup) (158).<br>Pack:<br>Sirup pack:<br>Cover promptly with 40- to 60-percent sirup, depending on tartness of fruit (158). | Chemical treatment:<br>Ascorbic acid:<br>Use 0.1 percent (76).<br>Sulfur dioxide:<br>Recommend 100 p.p.m. in $SO_2$ if stored 6 months or longer (76).<br>Pack:<br>Sirup pack:<br>Concentration of sirup recommended:<br>40- to 50-percent (38).<br>50-percent (19).<br>50-to 60-percent (100, 163).<br>60-percent (76).<br>60- to 70-percent (40, 148).<br>Sugar pack:<br>Use 1 part sugar to 3 parts plum halves or quarters (76).<br>Use 1 pound sugar to 4 pounds fruit (165).<br>Add 1 pound sugar to each 3 to 5 pounds fruit. Mix until enough juice is drawn out to cover fruit (158). |
| Puree | Preparation:<br>Use fully ripe fruit. Wash, halve, pit, and press raw fruit through a sieve (38).<br>Chemical treatment:<br>Ascorbic acid:<br>Use 0.02 to 0.03 percent by weight (76).<br>Citric acid:<br>Use 0.5 percent (76).<br>Heat treatment:<br>Heat just to the boiling point, adding only enough water to keep the fruit from burning. Cool and press through a sieve. Sweeten and pack (148). | Heat treatment:<br>Steam for 7 minutes, or add 1 cup water to 4 pounds fruit and boil 2 minutes (115).<br>Pack:<br>Sirup pack:<br>For dessert puree: Use 1 part 67-percent sirup to 2 parts by volume of Santa Rosa or Claret plum puree (132). |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Plums, prunes-con.:** | Pack: | Pack-con.: |
| Puree-con. | Sugar pack: | Sugar pack: |
| | Add 1 part sugar to each 3 or 4 parts raw fruit puree (38, 100). | Use 2 1/3 cups sugar for each cup puree (148). |
| | Mix thoroughly and promptly (38, 100). | Use 1 cup Sweetose sirup for each cup puree (148). |
| | | Use 1 cup sugar to 8 cups puree (115). |
| Juice ---------- | | Preparation: |
| | | Cover red plums with water; heat to 180° to 190° F. until soft; strain. Cool juice and treat with pectic enzyme 24 hours; filter and sweeten to 30° to 35° Balling. Dilute with half water (27). |
| **Raspberries:** | | |
| Whole ---------- | Preparation: | Preparation: |
| | Sort, wash carefully in cold water, drain thoroughly. | Omit washing if berries are not dusty (100). |
| | Pack: | Pack: |
| | Sugarless pack: | Sugarless pack: |
| | Add no sugar or sirup (96, 158). | Freeze loose on trays before packing (38). |
| | Sirup pack: | Sirup pack: |
| | Cover with 40-percent sirup (91, 100, 161). | Concentration of sirup recommended: |
| | | 30- to 40-percent (161). |
| | | 40- to 60-percent for black raspberries (100). |
| | | 40- to 50-percent for red, purple, and yellow raspberries (100). |
| | | 40- to 68-percent, 1 part sirup to 3 parts fruit (91). |
| | Sugar pack: | Sugar pack: |
| | Add 1 pound sugar to 4 pounds berries (40, 54, 143, 158, 163). | Proportion of sugar to fruit recommended: |
| | | 1 part sugar to 3, 4, or 5 parts fruit (38). |
| | | 1 part sugar to 2 to 5 parts fruit (76). |
| | | 1 cup sugar to 5 cups fruit (161). |
| | | 1 part sugar to 3 or 4 parts by weight for black raspberries (100). |
| | | 1 part sugar to 4 parts by weight for red, purple, and yellow raspberries (100). |
| | | 1 part sugar to 4 parts berries for red raspberries (163). |
| | | Dry sugar not recommended for black raspberries (163). |
| Crushed -------- | Sugar pack: | |
| | Add 1 pound sugar to 3 pounds crushed berries (96). | |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Raspberries-con.:** | | |
| Puree | Preparation:<br>Press through a sieve.<br>Pack:<br>Sugar pack:<br>Mix 1 pound sugar with each 3 pounds fruit puree (38). | Pack:<br>Sirup pack:<br>For dessert puree: Use 1 part 50-percent sirup to 1 part by volume of Ranaree raspberry puree (132).<br>Sugar pack:<br>For black raspberries add 1/2 cup water for each 2 pounds fruit. Heat to boiling point. Mix 1 cup sugar with 6 to 8 cups fruit puree (115). |
| Juice | Preparation:<br>Crush and heat berries slightly to start flow of juice. Press hot fruit in a jelly bag to extract juice. Cool (148). | Preparation:<br>Sweeten if desired (40, 148). |
| **Rhubarb:** | | |
| One-inch pieces | Preparation:<br>Wash, trim, and cut into 1-inch pieces.<br>Heat treatment:<br>Preheat in steam:<br>1 1/2 to 2 minutes (76).<br>Preheat in boiling water:<br>1 1/2 minutes (40, 96, 100, 148, 163).<br>Cool in cold water, drain (100).<br>Pack:<br>Sugarless pack:<br>Pack raw without sirup or sugar (40, 45, 137, 158, 163).<br>Pack preheated rhubarb without sugar or sirup (38, 40, 76, 96, 100, 148).<br>Sirup pack:<br>Cover raw fruit with 40-percent sirup (45, 158).<br>Sugar pack:<br>Mix 1 pound sugar with 4 or 5 pounds raw fruit (45, 158). | Heat treatment:<br>Preheat in steam:<br>2 minutes (148).<br>Preheat in boiling water:<br>Boiling water preferred to steam (148).<br>Preheating not essential; sometimes used for sugarless pack (100).<br>Pack:<br>Sirup pack:<br>Concentration of sirup recommended:<br>40- to 50-percent (100).<br>45-percent (169).<br>60-percent (163).<br>Sugar pack:<br>Use 1 pound sugar with 4 pounds preheated fruit (96). |
| Puree | Preparation:<br>Add 1 cup water to 2 pounds rhubarb and boil 2 minutes. Press through a sieve or grind. Mix 1 cup sugar with 6 cups puree (115). | |

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Rhubarb-con.:** | | |
| Sauce | Preparation:<br>Cook in a 60-percent sirup, cool (163). | Preparation:<br>Prepare as a sauce (96). |
| Juice | Preparation:<br>Cut rhubarb in pieces 4 to 6 inches long, add 2 quarts water for each 10 pounds rhubarb, and just bring to a boil. Press hot fruit in jelly bag to extract juice. Cool. Sweeten to taste if desired (148). | |
| **Strawberries** | Preparation:<br>Sort and wash berries in cold water. Drain well and remove hulls. Berries may be cut in halves, sliced, crushed, or left whole. | |
| Whole | Pack:<br>Sirup pack:<br>Cover fruit with 50-percent sugar sirup (38, 100, 148).<br><br>Sugar pack:<br>Mix well 1 pound sugar with 4 pounds fruit [2/] (53, 122, 158, 165). | Pack:<br>Sirup pack:<br>Concentration of sirup recommended:<br>40- to 50-percent (38).<br>50- to 60-percent (92, 100, 148).<br>65-percent (146).<br>70-percent (17).<br>1 part sugar dissolved in cold water to 4 parts fruit (165).<br>Sirup preferred (38, 92, 146, 148).<br>Sugar pack:<br>1 pound sugar to 3 or 4 pounds fruit (158).<br>1 pound sugar to 4 or 5 pounds fruit (100).<br>Sugar pack preferred [2/] (53). |
| Slices | Sugar pack:<br>Mix gently with sugar in proportion of 1 pound sugar to 4 pounds berries (53, 100, 146). | Chemical treatment:<br>The addition of 4.89 percent methoxyl pectin resulted in jellied products (3). |
| Crushed | Sugar pack:<br>Add 1 pound sugar to 4 pounds crushed fruit (100, 146). | |
| Puree | Preparation:<br>Press berries through a sieve (76).<br>Chemical treatment:<br>Ascorbic acid:<br>Use 0.02 to 0.03 percent by weight (76).<br>Citric acid:<br>Use 0.5 percent (76). | |

See footnotes, page 95.

| Fruit | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Strawberries-con.: | | |
| Puree-con. | Pack: | Pack: |
| | | Sirup pack: |
| | | Use heavy sirup (76). |
| | | For dessert puree: Use 1 part 67-percent sirup to 2 parts by volume of fruit puree (132). |
| | Sugar pack: | Sugar pack: |
| | Add 1 pound sugar to 4 pounds fruit puree (76). | Add 1 cup sugar to 6 cups puree (115). For ice cream: Add 1 pound sugar to 5 or 6 pounds fruit (76). |
| Watermelon | Not recommended (76). | Recommended only as puree (148). |
| Youngberries: | | |
| Whole | Same as Blackberries, page 31. | Pack: |
| | | Sirup pack: |
| | | Concentration of sirup recommended: |
| | | 45- to 50-percent (112). |
| | | 75-percent corn sirup solution (141). |
| Puree | Same as Blackberries, page 31. | Sirup pack: |
| | | For dessert puree: Use 1 part 67-percent sirup to 2 parts by volume of youngberries (132). |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Breads:** | | |
| Biscuits: | | |
| Unbaked ---------- | Formula:<br>Use standard recipes (50, 130, 139).<br>Use double-acting baking powder (50,69). | Formula:<br>Sodium aluminum sulfate baking powder best, tartrate next, phosphate third (69). |
| | Preparation:<br>Roll and cut dough before freezing (50, 109, 130, 139).<br>Freeze as quickly as possible (130). | Preparation:<br>Thin biscuits are more successful than thick ones (50). |
| | Packaging:<br>Stack one on another in airtight container (109).<br>Place two sheets of waxed paper between layers (1). | Packaging:<br>Place in containers in which to be baked; overwrap with moistureproof paper (1).<br>Pack cut biscuits in waxed tubs, stack one on top of the other with two layers of cellophane between each two biscuits (50).<br>Pack in closely fitted moistureproof wrappers (178).<br>Place moisture-vapor-proof material on inside of carton; place pieces of the wrapping material between biscuits and fold lining tightly around biscuits; seal with tape (130).<br>Freeze on pan, package within 24 hours (130). |
| | Storage:<br>1 month (1, 109). | Storage:<br>2 to 3 weeks (50).<br>About 2 to 4 weeks (1).<br>1 month with tartrate and phosphate baking powder (69).<br>4 months with sodium aluminum sulfate baking powder (69).<br>Many months (178). |
| | Thawing and baking:<br>Bake on greased baking sheet:<br>Thawed, 12 to 15 minutes at 425° F. (50).<br>Unthawed, 20 to 25 minutes at 425° (50). | Thawing and baking:<br>Partially thaw before baking (1).<br>Thaw in package (178).<br>Thaw completely (109).<br>Bake while frozen on greased baking sheet, or partially thaw 30 minutes at room temperature (50).<br>Remove from package, defrost at room temperature 1 hour, bake in hot oven (425° F.) about 15 minutes; or bake without defrosting in 300° oven 15 minutes, finish in hot oven 10 to 15 minutes (130). |
| Baked before freezing---------- | | More certain of success when frozen after baking (50). |
| | Formula:<br>Use standard recipes (50,130). | Formula:<br>Tartrate baking powder gave best product (69). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Breads-con.:**<br>Biscuits-con.:<br>Baked before freezing-con. | Preparation:<br>Prepare and bake as usual. Cool, freeze immediately (1).<br>Packaging:<br>Place biscuits in cardboard boxes, wrap in moisture-vapor-proof material, heat-seal (1,69).<br>Storage:<br>3 months (1).<br>Thawing and heating:<br>Thaw in wrapper in slow oven (250° F.) 20 minutes (69). | Preparation:<br>Cool to room temperature (130).<br>Packaging:<br>Pack in frozen food containers and fill spaces with waxed paper (1).<br>Place moisture-vapor-proof material on inside of carton, place pieces of the material between biscuits and fold lining tightly around biscuits, seal with tape (130).<br>Storage:<br>2 to 8 weeks (50).<br>Store at 0° F. Baked frozen more satisfactory than raw frozen at nearly all storage periods (0 to 12 months) (69).<br>Thawing and heating:<br>Thaw at room temperature, wrapped. Warm at 250° to 300° F. if desired (1).<br>Thaw at room temperature, wrapped in package, reheat in hot oven (425° F.) 5 minutes (130).<br>Place hard-frozen biscuits on baking sheets and reheat in moderate oven (375° F.) 15 minutes (130).<br>Bake 15 minutes at 300° F. (50). |
| Muffins:<br>Unbaked ---------- | Formula:<br>Use standard recipes (50,130).<br>Preparation:<br>Prepare as usual; fill paper baking cups two-thirds full.<br>Freeze (50,130).<br>Packaging:<br>After freezing in paper cups, package within 24 hours. Nest cups and wrap in moisture-vapor-proof material or place in cellophane-lined cartons (130).<br>Heat-seal or seal with tape (50,130). | Formula:<br>Use double-acting baking powder (50).<br>Preparation:<br>Place batter in container in which it can be baked; less leavening is lost (50).<br>Packaging:<br>Freeze batters in pans and overwrap with moistureproof paper (1).<br>Fit paper cups of batter into box lined with moisture-vapor-proof material, fold liner over cups, seal with tape, then freeze (130).<br>Pour batter into any moistureproof container (148).<br>Pour batter into waxed tubs (69).<br>Storage:<br>About 2 to 4 weeks (1).<br>2 weeks (148).<br>2 months (69).<br>Flavor, tenderness, texture less satisfactory when stored over 2 months (69). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Breads-con.:** | Thawing and baking: | Thawing and baking: |
| Muffins-con.: | Thaw at room temperature 1 hour, bake same as fresh muffins (130). | Thaw at room temperature (1). |
| Unbaked-con. | | Remove muffin cups from cartons, place in muffin pans, bake in slow oven (300° F.) 15 minutes, finish in hot oven (425°) 15 to 20 minutes (130). |
| | | Thaw at room temperature 1 hour, bake at 400° F. for 35 minutes (69). |
| | | Thaw in refrigerator or at room temperature before baking, or bake unthawed (50). |
| Baked before freezing -------- | Formula: | |
| | Use standard recipes (50,130). | |
| | Preparation: | |
| | Prepare as usual, bake, cool (130) | |
| | Freeze as quickly as possible (1,130). | |
| | Packaging: | Packaging: |
| | Use moisture-vapor-proof material or bags and heat-seal. Place in cardboard boxes for added protection (1,69,148). | Line box with moisture-vapor-proof material; optional to leave in cups (130). |
| | | Pack in moistureproof paper or frozen-food containers. Fill spaces with waxed paper (1). |
| | | Pack in folding waxed carton, overwrap with moistureproof cellophane, heat-seal (148). |
| | | Storage: |
| | | About 3 months (1). |
| | | 6 months (148). |
| | | 12 months (69). |
| | Thawing and heating: | Thawing and heating: |
| | Thaw in package at room temperature about 1 hour (1,130). | After thawing at room temperature, reheat in hot oven (400° F.) 5 to 8 minutes (130). |
| | Reheat in oven at 250° to 300° F. (1) | Thaw in slow oven (250° F.) 45 minutes (69). |
| Yeast bread: | | |
| Unbaked --------- | | Texture is coarser and less uniform than fresh bread (97). |
| | Formula: | Formula: |
| | Use standard recipes (1,50). | Dry yeast made better bread than compressed yeast (69). |
| | | Decrease amount of yeast 50 percent (97). |
| | | Increase sugar 50 percent (97). |
| | | A 50-percent increase in fat made an unacceptable product (97). |
| | | Doughs containing 75 to 100 percent whole-wheat were not satisfactory (97). |
| | Preparation: | Preparation: |
| | After first rising, shape into loaves or flatten bulk dough to 1- or 1 1/2-inch thickness (1). | Shape into loaves or freeze bulk dough (148). |
| | | Roll dough to thickness of 1 inch (50, 159). |
| | Grease all surfaces. Freeze immediately (1). | Freeze bulk dough after one rising (32,130). |
| | | Doughs could be held longer with no risings before freezing (97). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Breads-con.:** | | |
| Yeast bread-con.: | | |
| Unbaked-con. | Packaging: | Packaging: |
| | Wrap flattened dough in moisture-vapor-proof material with two sheets of waxed paper between layers of dough (1). | Pack in moisture-vapor-proof material sealed with tape (130). |
| | | Pack in cellophane bags with cardboard cartons (69). |
| | Freeze loaves in pans wrapped in moistureproof cellophane, heat-seal (148). | Pack in moistureproof cellophane, heat-seal, pack in waxed cartons (97). |
| | | Package dough as a sheet, seal (50). |
| | | Wrap loaf in moistureproof cellophane, in waxed carton overwrapped with moistureproof material, heat-seal (148). |
| | | Pack bulk dough in moistureproof cellophane-lined cartons, overwrap, heat-seal (148). |
| | | Freezing temperature: |
| | | Sharp freeze at once (32). |
| | | Freeze at -10° F. (97). |
| | Storage: | Storage: |
| | Not over 2 months (50, 69, 97). | 2 weeks (159). |
| | | 2 to 4 weeks (1). |
| | | 1/2 to 2 months (50). |
| | | 6 to 8 weeks at 0° F. for white bread (97). |
| | | Not over 4 or 5 weeks at 0° F. for bread containing more than one-half whole-wheat flour (97). |
| | | Yeast may weaken on long storage (148). |
| | | Longer storage required longer rising period (97). |
| | Thawing and baking: | Thawing and baking: |
| | Thaw wrapped dough in warm, moist place (1). | Place sheet dough in 200° F. oven, with door open and pan of steaming water in oven; as edges thaw, turn into center (50). |
| | Shape bulk dough into loaves (1). | Thaw dough completely, shape, let rise (159). |
| | Let rise in pans in a warm place (1). | Completely thaw in unopened container, proceed as with fresh dough (33). |
| | Bake at 400° F. 30 to 40 minutes (130). | Thaw in wrapper 1 1/2 to 2 hours at room temperature (97). |
| | | Let wrapped bread stand overnight in refrigerator; knead, shape, allow to rise (130). |
| | | Place in pan of water at 30° C. until thawed and doubled in bulk (4 1/2 hours) (69). |
| | | Bake 35 minutes in hot oven (400° F.) (69). |
| Baked before freezing ---------- | | Better to bake bread before freezing (43, 69, 159). |
| | | Easier and more sure to bake bread before freezing (43). |
| | Formula: | Formula: |
| | Use standard recipes (50, 136). | Use recipe with more fat and sugar than for fresh product (50). |
| | | Dry yeast made better bread than compressed yeast (69). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Breads-con.:** | | |
| Yeast bread-con.: | | |
| Baked before freezing-con. | Preparation: | Preparation: |
| | Prepare and bake bread as usual (50, 136). | Cool thoroughly and quickly (32, 43, 148). |
| | Cool quickly (32, 43, 50, 148). | Cool to room temperature (1). |
| | Packaging: | Packaging: |
| | Wrap in moisture-vapor-proof material (1, 32, 43, 69, 130, 148). | Wrap well, seal, freeze quickly (136). |
| | | Tie in stack (69). |
| | | Pack in metal foil or other moisture-vapor-proof paper, in outer cardboard container (43). |
| | Heat-seal (32, 148) or seal with tape (130). | Pack in moistureproof paper or frozen-food containers; fill spaces with waxed paper (1). |
| | | Wrap in heavy waxed paper (99). |
| | | Pack in moisture-vapor-proof bags or paper (32, 148). |
| | | Use cellophane laminated with wax (21). |
| | | Freezing temperature: |
| | | Sharp freeze at once (32). |
| | | The quicker the freezing the better the quality (21). |
| | | Storage: |
| | | 2 weeks (130). |
| | | About 3 months (1). |
| | | 6 or more months (43). |
| | | 11 months (69). |
| | | 12 or more months (50). |
| | Thawing and heating: | Thawing and heating: |
| | Thaw in wrappings at room temperature (1, 50, 136, 159). | An electric fan decreases thawing time (99). |
| | | Heating in package improves product (159). |
| | Use immediately (130). | Heat in wrappings for about 30 minutes in a 250° F. oven (136). |
| | | Time for thawing at room temperature: 30 to 40 minutes (33). 1 hour (130). 2 hours (99). 5 hours (69). |
| Yeast rolls: | | |
| Unbaked --------- | | More pleasing, fresher aroma from rolls frozen as dough (114). |
| | | Product from frozen dough often poor; better to freeze baked rolls (58). |
| | Formula: | Formula: |
| | Use plain or sweet, rich dough recipe (1, 49). | Any successful recipe may be used; those rich in fat and with more sugar may be most desirable (50). |
| | | Increase fat and sugar (136). |
| | | Better flavor and moisture content with milk than with water (49). |
| | | Increased sugar gave a better flavor (49). |
| | | Increased yeast (2 cakes per cup liquid) did not improve product (49). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Breads-con.:**<br>Yeast rolls-con.:<br>Unbaked-con. | | Formula-con.:<br>Doubling the standard proportion of yeast caused yeasty flavor (10).<br>Ingredients influenced quality of doughs while frozen, during reconditioning, and while baking (10). |
| | Preparation:<br>Shape rolls after one rising (130, 148).<br>Grease all surfaces (1, 136). | Preparation:<br>Rolls frozen before rising are excellent (49).<br>Frozen shaped rolls had better flavor than rolls made from frozen dough (1).<br>Dough frozen in ball or in 1/4-inch thick sheet not recommended (49).<br>Shape roll or form into sheet 1 to 1 1/2 inches thick, grease all surfaces, freeze immediately (1).<br>Roll to 1-inch thickness (159).<br>Freeze bulk dough after one rising (32, 109, 140). |
| | Packaging:<br>Place shaped rolls in shallow container or in paper baking cups (148), wrap with cellophane or metal foil, heat-seal (111).<br>Freeze immediately (49, 114, 130). | Packaging:<br>Wrap close together in shallow packages, lay cellophane or waxed paper on top, and thin, stiff paper between layers (50).<br>Airtight cartons, sealed (109, 139).<br>Moistureproof wrappings or containers, two sheets of waxed paper between layers, air spaces filled with waxed paper (1).<br>Place shaped rolls in shallow pans, cover with cellophane, seal, freeze immediately (136).<br>Place moisture-vapor-proof material on inside of container. Place pieces of the material between rolls, fold lining material tightly around rolls, seal with tape (130).<br>Wrap pans of shaped rolls in moistureproof cellophane, heat-seal; or put cloverleaf rolls in paper baking cups, pack in folding waxed cartons overwrapped with moistureproof cellophane, heat-seal (148).<br>Place biscuits on metal pan, freeze, package within 24 hours (130). |
| | | Freezing temperature:<br>Freeze at -10° F. (139, 140).<br>Sharp freeze at once (32). |
| | Storage:<br>Not over 6 weeks (109, 139, 140). | Storage:<br>2 weeks (159).<br>2 to 4 weeks (1).<br>1/2 to 2 months (50).<br>1 month (114, 148).<br>Few weeks only (136).<br>Short time (58).<br>When stored over 6 weeks, off-flavors and odors develop (140). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Breads-con.:** | | |
| Yeast rolls-con.: | | |
| Unbaked-con. | Thawing and baking: | Thawing and baking: |
| | Thaw in warm, moist place (1, 130, 136), let rise until light, and bake at usual temperature (33, 49, 136). | Thaw, let rise, shape, proof, and bake (140). |
| | | Thaw and let rise 2 to 2 1/2 hours, bake at 400° to 425° F. for 15 to 20 minutes (114). |
| | | Thaw in package at room temperature, let rise, bake (148). |
| | | Thaw at room temperature, shape, allow to double in bulk, bake at 400° F. (139). |
| | | Fully risen rolls are better when baked without thawing than when thawed and then baked (49). |
| | | Thaw in warm, moist place. Shape bulk dough and let rise, place rolls in pans to rise (1). |
| | | Place in warm, greased muffin tins to rise for 1 to 2 hours (50). |
| | | Thaw in warm, moist place (80° to 85° F.) until light (2 hours), bake at usual temperature (136). |
| | | Thaw and let rise to double in bulk, shape (109). |
| | | Thaw completely, shape, allow to rise (159). |
| | | Thaw completely in unopened container; proceed as with fresh dough (33). |
| | | Remove from package, set in warm place or arrange on pan over slightly steaming water for 1 to 1 1/2 hours (130). |
| Baked before freezing-------- | | Better to bake before freezing (43, 49, 58, 159). |
| | | Fewest chances for failure when baked before freezing (49). |
| | | Baking rolls before freezing is easier and surer than freezing dough (43). |
| | Formula: | Formula: |
| | Use standard plain or sweet-dough recipes (1, 49, 58, 114, 130, 136). | Better flavor and moisture content with milk than with water (49). |
| | | Increased sugar gave a better flavor (49). |
| | | Use recipe with more fat and sugar than for fresh rolls (50). |
| | | Increased yeast (2 cakes per cup liquid) did not improve product (49). |
| | Preparation: | Preparation: |
| | Prepare and bake as usual (1, 49, 58, 114, 130, 136). | Cool thoroughly and quickly (43, 148). |
| | Cool quickly (1, 32, 43, 50, 130, 136, 148). | |
| | Wrap and freeze immediately (114). | |
| | Packaging: | Packaging: |
| | Wrap in moisture-vapor-proof material and heat-seal (1, 32, 43, 114, 130, 148). | Metal foil or other moisture-vapor-proof paper (43). |
| | | Cellophane or metal foil (114). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Breads-con.:** | Packaging-con.: | Packaging-con.: |
| Yeast rolls-con.: | Place in cardboard container (43,130). | Heavy waxed paper (99). |
| Baked before freezing-con. | | Place moisture-vapor-proof material on inside of container, place pieces of the material between rolls, and fold lining material tightly around rolls; seal with tape (130). |
| | | Fill spaces with waxed paper (1). |
| | | Freezing temperature: |
| | | Sharp freeze at once (99). |
| | | Storage: |
| | | Short time (58). |
| | | 1 month (114). |
| | | About 3 months (1). |
| | | 6 or more months (43). |
| | | 12 months (49, 50, 148). |
| | Thawing and heating: | Thawing and heating: |
| | Reheat in sealed wrappings about 15 minutes in 250° to 300° F. oven (1, 50). | Reheat in wrappings in a 250° F. oven for 15 to 20 minutes (136). |
| | Use immediately (49, 58). | Thaw in 250° to 350° F. oven, in wrappings (49). |
| | | Place unopened package in 350° F. oven for 20 minutes (33). |
| | | Reheat in wrappings at 400° F. for 25 minutes (114). |
| | | Thaw 1 hour in wrappings, remove from package, heat in hot oven (400° F.) 5 minutes (130). |
| | | Remove wrappings and place in bun warmer or paper bag in oven (50). |
| | | Thaw at room temperature and heat in package (159). |
| | | Thaw unopened package at room temperature 30 to 40 minutes (33). |
| | | Thaw at room temperature 2 hours; use of an electric fan shortens thawing time (99). |
| | | Rolls stale rapidly after thawing and reheating (58). |
| | | If held after taking from freezer, rolls acquire stale flavor (49). |
| **Cakes:** | | |
| Plain: | | |
| Unbaked ..... | Formula: | Formula: |
| | Use standard recipes (32, 130, 136) | Use double-acting baking powder if batter packaged in carton or jar (50, 114). |
| | | Cakes made with synthetic vanilla unpalatable after 6 months (59). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cakes-con.:** | | |
| Plain-con.: | | |
| Unbaked-con. | Preparation: | Preparation: |
| | Prepare as usual. Pour batter into greased baking pan (130, 148), package, and freeze immediately (114). | Freeze and then wrap (32). |
| | Packaging: | Packaging: |
| | Wrap in moisture-vapor-proof material, seal by heat or with tape (1, 32, 50, 130, 148). | Moisture-vapor-proof cartons, tubs, or cellophane (1, 32, 50, 130, 140, 148). |
| | | Cylinder type of carton with slip-on lid (114). |
| | | Waxed tubs (69). |
| | | Line metal baking pans, except stainless steel, with waxed paper (1, 50). |
| | | Line pan with parchment, wrap in waxed paper and laminated cellophane, lock-fold, seal with Scotch tape (59). |
| | Storage: | Storage: |
| | 2 months (32, 50, 59, 69). | 2 weeks (148). |
| | | 2 to 3 weeks (1). |
| | | 6 to 8 weeks (32). |
| | | 2 to 3 months (50). |
| | | 4 months (140). |
| | | Several months (114). |
| | | After 2 months cakes were compact with heavy layer at bottom (59). |
| | Thawing and baking: | Thawing and baking: |
| | Loaf cakes: | Thaw 1 hour at room temperature (69). |
| | Thaw completely at room temperature (1, 50, 136, 148). | Thaw 1 to 2 hours in container (130). |
| | | Thaw in refrigerator overnight or several hours at room temperature (114). |
| | Bake as for freshly prepared batter (130). | Completely thaw batters in baking pans; if in cartons, thaw until soft, then transfer to pan and complete thawing (50). |
| | Layer cakes: | Cakes stored at -10° F. required 56 minutes to reach soft consistency, 81 minutes for pour-soft consistency; when stored at 0° F., 5 minutes less was required (59). |
| | Bake without thawing (1, 50). | Loaf cakes partially thawed at room temperature tend to hump during baking (50). |
| | Allow longer baking time (1). | After thawing, transfer to greased pans lined with waxed paper, leave at room temperature 10 to 20 minutes, then bake (114). |
| | | After thawing, bake as for freshly prepared batter (130). |
| Baked before freezing | Prebaked preferred to unbaked; has better volume (58, 59, 69). | |
| | Formula: | Formula: |
| | Use standard recipes (32, 50, 114, 148). | Use ingredients of highest quality (114). |
| | | Vanilla gives disagreeable flavor (58). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cakes-con.:** | | |
| Plain-con.: | | |
| Baked before freezing-con. | | Formula-con.: |
| | | Phosphate baking powder best, tartrate next, sodium aluminum sulfate unacceptable (69). |
| | | Cakes made with lard change flavor after 4 months (59). |
| | Preparation: | Preparation: |
| | Mix and bake as usual (32, 50, 114). | Cool in pan; remove to cake rack and cool 45 minutes longer (114). |
| | Remove cake from pan (50, 136). | Freeze without frosting or filling (1, 32, 43). |
| | Cool thoroughly before wrapping (1, 32, 43, 50, 136). | |
| | Freeze immediately (114). | |
| | Packaging: | Packaging: |
| | Wrap in moisture-vapor-proof material (1, 32, 50, 58, 69, 114, 148, 178), heat-seal, and store in cartons (1, 50, 69). | Package in amounts to be used at one time (50). |
| | | Freeze in pan in which baked, with collar fitted around sides (148). |
| | | Overwrap with moistureproof cellophane, heat-seal (32, 114, 148). |
| | | Place in metal container or heavy carton (1, 69). |
| | | Freeze in cake pan or carton covered with foil (43). |
| | Storage: | Storage: |
| | 4 months (1, 43, 50, 59). | Stored at 0° F. (1, 43, 50, 58, 59, 69, 148): |
| | | Not more than 2 months (58). |
| | | 3 to 4 months (1). |
| | | 4 or more months (43). |
| | | 4 to 8 months (50). |
| | | 6 months (148). |
| | | 11 months (satisfactory) (69). |
| | | Flavor changes after 4 months, especially in lard cakes (59). |
| | Thawing and heating: | Cakes with synthetic vanilla were unpalatable after 6 months (59). |
| | Loaf: | Thawing and heating: |
| | Thaw in wrapper at room temperature 2 1/2 hours, or with an electric fan 90 minutes, or in a 300° F. oven 30 minutes (50). | Thaw large cake in original wrapping: |
| | | 2 hours at room temperature (1, 114). |
| | | 80 minutes with an electric fan (1). |
| | | 20 to 30 minutes in a 300° F. oven (114). |
| | | A very short while in a 250° to 300° F. oven (1). |
| | Layer: | |
| | Thaw in wrapper at room temperature 1 hour, or with an electric fan 40 minutes, or in a 300° F. oven 10 minutes (50). | |
| Chocolate--------- | Unbaked product better than prebaked (69). | |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cakes-con.:** | | |
| Chocolate-con. | Formula:<br>Use standard recipe (50). | Formula:<br>Use one and one half times as much sugar as in plain cakes (139).<br>Storage:<br>8 months for prebaked and unbaked (69).<br>4 months (greatest decrease in volume occurred in first 2 months) (139). |
| Fruit ---------- | Formula:<br>Use standard recipe (50). | Storage:<br>Baked, 12 months (50).<br>Unbaked, 8 to 9 months (50). |
| Spice ---------- | Better to freeze unbaked rather than baked product (69). | Layer cake:<br>Unbaked better than prebaked cakes through 6 months' storage (69).<br>Loaf cake:<br>Unbaked better than prebaked at 4 months' storage (69). |
| | Formula:<br>Use standard recipe (50). | Storage:<br>Loaf, 4 months; unacceptable after 6 months (69). |
| Gingerbread------- | Gingerbread kept better than plain, spice, or chocolate cake (95). | |
| Cupcakes: | | |
| Unbaked ---------- | Formula:<br>Use standard recipes (50, 130, 148).<br>Preparation:<br>Fill paper cups one-half to two-thirds full (50).<br>Packaging:<br>Pack cups in a top-opening box, overwrap with moisture-vapor-proof material, heat-seal (50).<br>Thawing and baking:<br>Remove cups from package and thaw before baking (50, 130). | Preparation:<br>Pour into paper baking cups in muffin pans, freeze (148).<br>Packaging:<br>When frozen, pack cups in folding waxed cartons, overwrap with moistureproof cellophane (148).<br>Thawing and baking:<br>To hasten thawing, remove paper from frozen cupcakes and place the cakes in greased muffin pans (50).<br>Bake without defrosting in slow oven (300° F.) until fully risen and rounded (15 minutes). Finish at 350° (20 minutes) (130). |
| Baked before freezing ------- | Formula:<br>Use standard recipes (50, 130, 148).<br>Preparation:<br>Fill paper cups one-half to two-thirds full (50).<br>After baking cool the cupcakes (50). | |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cakes-con.:** | | |
| Cupcakes-con.: | | |
| Baked before freezing-con. | Packaging: | |
| | Place cupcakes in a top-opening box overwrapped with moisture-vapor-proof cellophane, heat-seal (50). | |
| | Thawing and heating: | |
| | Thaw at room temperature 40 to 60 minutes, or with an electric fan 30 minutes, or in a 300° F. oven 10 minutes (50). | |
| Sponge and angel food: | | |
| Unbaked--------- | Not as fine grained as baked frozen cakes (114). | Freezing egg whites more practical than freezing cake (114). |
| | Formula: | Formula: |
| | Use standard recipes (50, 114, 136, 148). | Use fresh or frozen whites (114). |
| | Preparation: | |
| | Prepare batter as usual, pour immediately into baking pan (1, 50, 136). | |
| | Packaging: | Packaging: |
| | Wrap pan in moisture-vapor-proof material, seal, freeze at once (114, 136). | Waxed tubs (69). |
| | | Storage: |
| | | Sponge: 1 month (69). |
| | | Sponge and angel: 2 weeks (50), 6 months (148). |
| | Thawing and baking: | |
| | Bake without thawing (1, 50, 136). | Thawing and baking: |
| Baked before freezing------- | | Partially thaw (50, 136). |
| | Formula: | |
| | Use standard recipes (50, 114, 130, 136). | |
| | Preparation: | |
| | Bake as usual. Cool thoroughly (130, 136). | Preparation: |
| | Remove from pan (114). | Bake and cool 1 hour inverted; remove from pan (114). |
| | Packaging: | |
| | Wrap in moisture-vapor-proof material, heat-seal (50, 69, 114, 130, 136). | Packaging: |
| | | Cellophane or metal foil (114). |
| | | Cellophane bags (69). |
| | Place in box (50, 69, 114, 136) for greater protection. | Cellophane or locker paper (136). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cakes-con.:**<br>Sponge and angel food-con.:<br>Baked before freezing-con. | Thawing and heating:<br>Thaw in wrappings (50, 114, 136):<br>2 hours at room temperature (50).<br>75 minutes with an electric fan (50).<br>15 minutes in a 300° F. oven (50). | Storage:<br>Sponge: 1 month (69).<br>Do not keep for long periods (136).<br>Thawing and heating:<br>Thaw in wrappings at room temperature (136):<br>1 hour (130).<br>2 to 3 hours (114).<br>Thaw in slow oven (300° F.) 20 to 30 minutes (114). |
| **Cake frostings and fillings** ------ | Formula:<br>Recommended:<br>Confectioner's sugar and fat (50, 69, 136).<br>Cooked-candy type with honey or corn sirup (50, 136).<br>Fudge (50).<br>Penuche (50, 136).<br>Fruit (136).<br>Apricot (50).<br>Raisin (50).<br>Nut (50, 136).<br>Not recommended:<br>Soft frostings (50, 136).<br>Boiled icings (50, 69, 136).<br>Cream fillings (50, 136).<br>Thawing:<br>Thaw in their original sealed packages in the refrigerator (50). | Thawing:<br>Thaw at room temperature (136).<br>Some frostings thawed at room temperature tend to become grainy (50).<br>If paper sticks to the frosting, loosen it before thawing (50).<br>Keep iced cakes in the refrigerator until serving time (50). |
| **Cookies:**<br>Bar---------- | Little difference between freshly baked cookies, those baked before freezing, and those freshly baked from frozen dough (50). | |
| Unbaked --------- | Formula:<br>Most recipes are successful (1, 43, 50, 136, 148). | |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cookies-con.:** | | |
| Bar-con.: | | |
| Unbaked-con. | Preparation: | |
| | Use standard procedures (50). | |
| | Packaging: | Packaging: |
| | Bulk dough: | Tub or cartons (50). |
| | Place in frozen-food containers of suitable size and shape (1, 50, 136, 148). | Round containers (136). |
| | | Cellophane-lined cartons, overwrapped with moistureproof sheeting, heat-sealed (148). |
| | Shaped in pans: | |
| | Place in baking pans (1, 50, 136), wrap in moistureproof cellophane, heat-seal (148). | |
| | Storage: | Storage: |
| | 6 months (50). | About 3 months (1, 148). |
| | | 6 to 9 months (50). |
| | Thawing and baking: | |
| | Thaw in unopened package (33) or, if frozen in pan, bake immediately (1, 50, 136, 148). | |
| Baked before freezing -------- | Formula: | |
| | Most recipes are successful (1, 43, 50, 136, 148). | |
| | Preparation: | |
| | Cool thoroughly (136). | |
| | Packaging: | |
| | Pack in top-opening box or tubular carton with waxed paper between layers and in air spaces (50, 136). | |
| | Storage: | Storage: |
| | 6 months (148). | About 3 months (1). |
| | | 12 or more months (50). |
| | Thawing: | |
| | Thaw in wrappings (33, 50, 136, 148) at room temperature (33, 136). | |
| Drop: | | |
| Unbaked---------- | Formula: | |
| | Most recipes are successful (1, 43, 50, 130, 136, 148). | |
| | Preparation: | |
| | Use standard procedures (50). | |
| | Packaging: | Packaging: |
| | Pack dough in round (43, 50, 136) or square frozen-food containers (1, 43). | 12-ounce waxed tubs (69). |
| | | Pack dough in moistureproof cellophane in waxed carton overwrapped with moistureproof sheeting, and heat-seal (148). |
| | | Pack bulk dough in airtight containers (139). |
| | | Freezing temperature: |
| | | 0° F. or lower (43, 139) |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cookies-con.:** | | |
| Drop-con.: | | |
| Unbaked-con. | Storage: | Storage: |
| | 6 months (43, 50). | About 3 months (1, 148). |
| | | 6 to 9 months (50). |
| | | 6 to 12 months at 0° F. or lower (43). |
| | | After 7 months at 0° F., compared favorably with fresh cookies (69). |
| | | After 1 year at 0° F., flavor and texture unchanged (139). |
| | Thawing and baking: | Thawing and baking: |
| | Thaw at room temperature until soft enough to be dropped by spoonfuls on greased baking sheet (1, 50, 136, 139, 148). | Without defrosting place on baking sheet, bake in 350° F. oven 10 to 12 minutes (130). |
| | | Completely thaw in unopened package (33). |
| | Bake at 400° F. 10 minutes (139). | Thaw at room temperature in waxed tubs 1 hour (69). |
| Baked before freezing-------- | Formula: | |
| | Most recipes are successful (1, 43, 50, 130, 136, 148). | |
| | Preparation: | |
| | Mix and bake in usual way (50). | |
| | Cool (1, 43, 130, 136). | |
| | Packaging: | Packaging: |
| | Pack in frozen-food containers with waxed paper crumpled around and between cookies (1, 43, 130, 136). | Tube cartons (43). |
| | | Frozen-food containers, cooky jars, or canisters with tight-fitting covers (1). |
| | | Box with top opening (136). |
| | | Line carton with moisture-vapor-proof material, separate cookies with the material, fold lining tightly around cookies, seal with tape (130). |
| | | Freezing temperature: 0° F. or lower (43). |
| | Storage: | Storage: |
| | 12 months (43, 50). | About 3 months (1). |
| | | Several months (130). |
| | | 6 months (148). |
| | | 6 to 12 months at 0° F. or lower (43). |
| | | 12 or more months (50). |
| | Thawing: | Thawing: |
| | Thaw at room temperature in container (1, 33, 136, 148). | Let stand 1/2 hour (130). |
| | | Unwrap and place on serving plates or thaw in containers (50). |
| Refrigerator: | | |
| Unbaked --------- | Formula: | |
| | Use standard recipes (1, 43, 50, 69, 130, 136, 148). | |
| | Preparation: | |
| | Shape into roll (1) or chill and slice (1, 43). | |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cookies-con.:** | Packaging: | Packaging: |
| Refrigerator-con.: | Roll: | Pack bulk dough in tube or square containers; wrap chilled roll or separate slices with paper (43). |
| Unbaked-con. | Wrap shaped roll in moisture-vapor-proof material, seal with heat or tape (130). | Wrap shaped roll in locker paper (1). |
| | Slices: | Pack in tubular or square containers or form into roll, wrap in cellophane; cover with stockinette; or slice chilled dough, pack with cellophane between each two (50). |
| | Place in layers in frozen-food containers with two layers waxed paper between layers (1). | Pack in round or square containers or roll, wrap in moisture-vapor-proof cellophane, cover with stockinette (136). |
| | | Wrap shaped roll in moistureproof cellophane, pack in waxed carton, overwrap with moistureproof cellophane, heat-seal (148). |
| | | Wrap in cellophane, drug-store fold, tie in stockinette (69). |
| | | Freezing temperature: |
| | | $0^{\circ}$ F. or lower (43). |
| | Storage: | Storage: |
| | 6 months (43, 50, 69). | About 3 months (1, 148). |
| | | 6 to 9 months (50). |
| | | 6 to 12 months at $0^{\circ}$ F. or lower (43). |
| | Thawing and baking: | Thawing and baking: |
| | Frozen in roll: | Frozen in roll: |
| | Slice and bake as usual on greased cooky sheet (1, 130, 136). | Thaw 1 hour in refrigerator before slicing (69, 136). |
| | Frozen slices: | Open wrap at one end, slice amount needed, bake in $350^{\circ}$ to $375^{\circ}$ F. oven 10 minutes (130). |
| | Bake without thawing (1, 50). | Frozen slices: |
| | | Thaw 1 hour in refrigerator (50). |
| Baked before freezing-------- | Formula: | |
| | Use standard recipes (1, 43, 50, 130, 136, 148). | |
| | Preparation: | |
| | Cool thoroughly before packing (1, 43, 50, 130). | |
| | Packaging: | Packaging: |
| | Pack in frozen-food container with waxed paper between layers and in spaces (1, 50, 136). | Tube cartons, paper between cookies and crumpled paper on top, outer carton for protection (43). |
| | | Frozen-food containers, cooky jars, or canisters with tight-fitting covers (1). |
| | | Top-opening box or tubular carton, according to size (50, 136). |
| | | Folding waxed carton, overwrapped with moistureproof cellophane, heat-sealed (148). |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Cookies-con.:** | | |
| Refrigerator-con.: | | |
| Baked before freezing-con. | | Packaging-con.: |
| | | Line carton with moisture-vapor-proof material, separate cookies with same material, fold lining tightly around cookies, seal with tape (130). |
| | | Freezing temperature: |
| | | 0° F. or lower (43). |
| | Storage: | Storage: |
| | 6 months (43, 148). | About 3 months (1). |
| | | 6 to 12 months at 0° F. or lower (43). |
| | | 12 or more months (50). |
| | | Several months (130). |
| | Thawing: | Thawing: |
| | Thaw at room temperature in wrappings (33, 136). | Thaw in original containers for a short period (1). |
| | | Unwrap and place on plates immediately or thaw in container if cookies lose crispness in air (50). |
| | | Let stand 1/2 hour (130). |
| Rolled: | | |
| Unbaked---------- | Formula: | |
| | Rolled butterscotch cookies (139). | |
| | Packaging: | |
| | Pack bulk dough in airtight cartons (139). | |
| | | Freezing temperature: |
| | | 0° F. or lower (139). |
| | Storage: | Storage: |
| | 1 year (139). | 1 year at 0° F.; flavor and texture unchanged (139). |
| | Thawing and baking: | |
| | Thaw at room temperature until soft enough to roll, bake at 350° F. (139). | |
| **Pies:** | | |
| Fruit, general: | | |
| Unbaked---------- | Better to freeze unbaked pies than baked pies 2/ (49, 50, 58, 95, 136, 159). | Pies frozen unbaked have flakier, more tender crust and fresher flavor than those baked before freezing (50, 136). |
| | | Baked frozen pies rate higher than unbaked (127). |
| | | Crusts of pies frozen unbaked crumble easily (148). |
| | Formula: | Formula: |
| | Use standard recipes (32, 50, 106, 114, 127, 130, 136, 139, 148). | Filling: |
| | | Fresh or frozen fruits (especially cherries) are better than canned fruits (49, 50). |
| | | Loose-pack frozen fruits may be used frozen, others are thawed slightly (50). |

See footnotes, page 95.

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:**<br>Fruit, general-con.:<br>Unbaked-con. | | Formula-con.:<br>Filling-con.:<br>Sugar pack helps retard browning of fruit (138).<br>Use 200 mg. ascorbic acid per quart sirup (95).<br>Do not use all of the juice from sirup pack (50).<br>Butter in filling helps retain fresh flavor (10, 49).<br>Minute tapioca prevented boiling over of juices, cornstarch next best, starch least effective (49).<br>Spices discolored product and caused off-flavors (10).<br>Crust:<br>Lard, hydrogenated lard, and hydrogenated vegetable fats are satisfactory (49, 50).<br>Decrease fat (49).<br>20 percent soybean flour substituted for equal amount of wheat flour increased tenderness and browning (113). |
| | Preparation:<br>Prepare as usual but do not slit top crust before freezing (32, 50, 109, 114, 139). | Preparation:<br>Thicken fruit fillings before filling pie shell (148).<br>Prepare fresh fruit and place directly in unbaked pie crust; cover with sugar (22).<br>Seal edges well and be sure top crust does not dip into filling (50, 136).<br>Make top crust 1/4 inch smaller in diameter than pie to avoid floating crust (10).<br>Lattice upper crust or pastry with hole in center helped prevent boiling over (49).<br>Piepan lined with dough and frozen, then sugar-flour coated fruit quickly added to dough, lattice applied and frozen (106, 123).<br>Freezing pastry before filling was added made no difference in crispness of under-crust (49). |
| | Packaging:<br>Pack in glass, metal, or special paper pie plates (23, 32, 49, 50, 106, 114, 130, 148, 159).<br>Cover with paper plate (50, 114, 136, 166).<br>Wrap in moisture-vapor-proof material (23, 32, 50, 58, 114, 127, 130, 136).<br>Heat-seal (50, 58, 114, 130, 139, 148).<br>If desired, cover with stockinette or paper box (32, 50, 136). | Packaging:<br>Wrappings:<br>Cellophane (23, 32, 50, 114).<br>Cellophane-lined parchment (32).<br>Pliofilm bags (32).<br>Metal foil (114).<br>Acetate film and foil laminated glassine structure, polyethylene sheet (127).<br>Waxed paper (139).<br>Waxed cartons (148). |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:** | | Packaging-con.: |
| Fruit, general-con. | | Overwraps: |
| Unbaked-con. | | Ordinary wrapping paper (114). |
| | | Stockinette (32, 50, 136). |
| | | Paper box (50, 136). |
| | | Pans (50). |
| | | Cellophane (148). |
| | | Protect with ring of cardboard cut taller than the pie (136). |
| | | Wrap before or after freezing (23, 130). |
| | | Thin paper plates and tin or aluminum pie plates are better than enamel or thick paper plates (49). |
| | | Freezing temperature: |
| | | $0^{\circ}$ F. or lower (58). |
| | | $0^{\circ}$ F. (32). |
| | | Frozen in single layers at $-7^{\circ}$ to $3^{\circ}$ F. (106). |
| | | $-10^{\circ}$ F. (22). |
| | | No difference between those frozen at $-10^{\circ}$ and $0^{\circ}$ F. (139). |
| | Storage: | Storage: |
| | 2 months (32, 148, 166). | 6 to 8 weeks (32, 148, 166). |
| | | 12 months (113). |
| | | Several months (130). |
| | | Low temperature (10). |
| | | $-40^{\circ}$ F. (95). |
| | Thawing and baking: | Thawing and baking: |
| | Remove wrappings, cut vent holes in top crust, and bake without thawing (23, 49, 50, 58, 130, 136, 148, 159, 166) for 15 or 20 minutes in a hot oven ($450^{\circ}$ to $475^{\circ}$ F.), then at $375^{\circ}$ until done (50, 159). | Bake in a $370^{\circ}$ F. oven for 60 minutes (10). |
| | | Bake in a $400^{\circ}$ F. oven for whole baking time (50, 159). |
| | | Bake in a $400^{\circ}$ F. oven for 40 to 60 minutes (130). |
| | | Bake in a $425^{\circ}$ to $450^{\circ}$ F. oven for 15 to 20 minutes, complete baking at $350^{\circ}$ (166). |
| | | Bake in a $450^{\circ}$ F. oven for 35 minutes, then 15 minutes at $350^{\circ}$ (58). |
| | | Bake at correct temperature for kind of pie, allowing 15 to 20 minutes extra (136). |
| | | Thaw 1 hour at room temperature; bake as fresh pie (159). |
| Baked before freezing-------- | Fruit pies freeze successfully (1, 58, 166). | Prebaked pies recommended (127, 148). |
| | | Prebaked pies are unsatisfactory (10). |
| | | Quality better if pies are baked after freezing (49). |
| | | Crust of frozen baked pie not as flaky as fresh pie; lower crust on unbaked pie is apt to be soggy (1). |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:**<br>Fruit, general-con.:<br>Baked before freezing-con. | Formula:<br>Use standard recipes (32, 43, 106, 114, 127, 130, 136, 148).<br>Either fresh or frozen fruit is recommended (1, 43, 50). | Formula:<br>Filling:<br>Fresh or frozen fruit (especially cherries) is better than canned fruit (49, 50).<br>May use frozen fruit after draining off excess juice (1).<br>Butter in filling helped retain fresh flavor (49).<br>Minute tapioca prevented boiling over of juices; cornstarch next best, starch least satisfactory (49).<br>Crust:<br>Lard and hydrogenated fats are both satisfactory (49).<br>Less fat is necessary in frozen pies than in fresh (49).<br>Use bland lard of high shortening value [2/]<br>20-percent soybean flour substituted for equal quantity of wheat flour increased tenderness and browning (113). |
| | Preparation:<br>Prepare and bake as usual, cool (1, 32, 43, 130, 166). | Preparation:<br>Latticed upper crust or pastry with hole in center helped prevent boiling over (49).<br>Sugar-flour coated fruit put into crust, lattice top applied moment before baking (106).<br>Cool and slip pie onto a paper pie plate (32). |
| | Packaging:<br>Use glass, tin, or special paper pie plate, cover with paper plate, wrap in moisture-vapor-proof material, heat-seal (1, 32, 43, 114, 136, 148, 166).<br>Cover with stockinette (32, 136) or paper box (43, 136). | Packaging:<br>Heat-seal in cellophane or metal foil, wrap in ordinary wrapping paper (114).<br>Protect with ring of cardboard cut taller than the pie (136).<br>Thin paper plates and tin or aluminum pie plates better than enamel or thick paper plates (49).<br>Moisture-vapor-proof material: Cellophane (32, 114, 136, 148), pliofilm bags (32), cellophane-lined parchment (32).<br>Wrap tightly and seal (130).<br>Remove pie from plate after freezing; wrap in heavy waxed paper cartons (113).<br>Freezing temperature:<br>0° F. (32).<br>0° F. or lower (43).<br>Storage:<br>2 or more months (43).<br>6 to 8 months (148).<br>12 months (113).<br>Many months (178).<br>Fruit pies freeze and store reasonably well (58).<br>Store at low temperature (10). |

See footnotes, page 95.

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:** | | |
| Fruit, general-con.: | | |
| Baked before freezing-con. | Thawing and heating:<br>Remove wrapper and heat at once in a 400° F. oven (130), or thaw at room temperature in the package (1, 123, 130, 148, 166, 178). | Thawing and heating:<br>Thaw an hour or two at room temperature, place in 350° F. oven 10 to 15 minutes (1, 166).<br>Thaw in oven until warm (148).<br>Thaw at room temperature:<br>6 hours (123).<br>8 hours (130).<br>Pies are better if thawed in the oven than at room temperature (49, 50, 123).<br>On thawing, pastry is likely to absorb moisture and lose crispness (178). |
| Apple: | | |
| Unbaked --------- | Better to freeze pies unbaked than to prebake them (67, 69, 114).<br>Formula:<br>Use firmer varieties of apples, since apples soften on freezing. Use standard recipe for pastry [2] (50). | Formula:<br>Greener apples had more flavor but were dry (105).<br>Apples that have not been pretreated to prevent oxidation become discolored. [2]<br>Use a bland lard of high shortening value. [2]<br>Lard used (105).<br>Hydrogenated or plain lard preferred (69).<br>Hydrogenated cottonseed oil shortening was used (67). |
| | Preparation:<br>Steam apple slices (50, 58, 105, 130, 136). 1 1/2 minutes (50, 105), cool, and drain (114); or dip slices in ascorbic acid solution (1 teaspoon ascorbic acid to 1 pint water) (130).<br>Do not slit top crust [2] (67, 69). | Preparation:<br>Crust:<br>To prevent sogginess in lower crust, roll slightly thinner than usual, and sprinkle with flour or cornstarch or brush with egg white or melted fat just before adding the filling (130).<br>Prick holes or cut slashes in top crust (130).<br>No difference in pastry made by hot water and conventional methods after 4 months' storage. Product of conventional method was more flaky on short storage (105).<br>Filling:<br>Apples left unpeeled (69).<br>Sugar and flour mixed and sprinkled over the fruit (67).<br>Steam sliced apples:<br>1 or 2 minutes (136).<br>3 minutes (58).<br>Sprinkle lemon juice or ascorbic acid solution on the filling (50, 136).<br>Dip slices in lemon juice (67, 130).<br>Dip slices for 1 minute in solution of 1 teaspoon sodium bisulfite to 1 quart water, drain, let stand 1 hour before freezing (58). |

See footnotes, page 95.

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:** | | |
| Apple-con.: | | |
| Unbaked-con. | | Preparation-con.: |
| | | Filling-con.: |
| | | Immerse apple slices in hot sirup (2 cups extra-sweet corn sirup and 2 quarts water) for 1 1/2 minutes, cool rapidly in colander. |
| | | Thicken sirup with cornstarch and add spices (cinnamon and nutmeg) (145). |
| | | Dip slices in cold thick sugar sirup (75 percent sugar) with 800 mg. ascorbic acid per gallon added (67). |
| | | Better to add sugar than to use sirup or to omit sugar from pies (105). |
| | Packaging: | Packaging: |
| | Use glass, metal, or special paper pie plate (114). | Wrappings: |
| | Cover with paper plate [2/] (114, 145). | Cellophane bags [2/] (105). |
| | | Cellophane (69, 105, 114, 145). |
| | | Metal foil (114). |
| | Wrap in moisture-vapor-proof material (69, 105, 114, 145). | Waxed paper (67). |
| | Heat-seal [2/] (114). | Overwrap: |
| | Cover with stockinette [2/] (69), if desired. | Ordinary wrapping paper (114). |
| | | Storage: |
| | | Store at 0° F. [2/] |
| | | 1 month, or longer (145). |
| | | 6 months or more (69, 114). |
| | | Crusts were crisp and tender (not stale or rancid) after 6 months (67). |
| | | Sirup held color of apples for 2 or 3 months (67). |
| | | Lemon juice preserved color 1 month (67). |
| | | Undercrust was less soggy when stored 4 months than after 1 month's storage (105). |
| | Thawing and baking: | Thawing and baking: |
| | Place unwrapped pie in 425° F. oven 5 minutes. Remove and cut vents in top crust. Return to oven and bake 55 minutes longer. [2/] | Bake in 425° F. oven 45 minutes (105). |
| | | Bake in hot oven (450°) 20 minutes; after 10 minutes prick top crust with a fork. |
| | | Reduce temperature to 350°, bake 50 minutes (114). |
| | | Pastry thawed at room temperature was soggy; oven thawing was better (105). |
| Baked before freezing -------- | | Methods of thawing had no effect on flavor and texture of apples (105). |
| | Baked apple pie may be frozen satisfactorily. [2/] | Better to bake apple pies before freezing (136). |
| | | Prebaked pies are not as desirable as pies frozen unbaked (67). |
| | | Prebaked pies are better than frozen unbaked and partially baked pies (105). |

See footnotes, page 95.

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Pies-con.:<br>Apple-con.:<br>Baked before freezing-con. | Formula:<br>Use standard recipe (114). | Formula:<br>Hydrogenated or plain lard is preferable to vegetable shortening (69).<br>Hydrogenated cottonseed oil was shortening used (67).<br>Lard used 2/ (105).<br>The greener apples had more flavor but were drier (105).<br>Better to add sugar than to use sirup or omit sugar (105). |
| | Preparation:<br>Mix sugar and flour and sprinkle over fruit (67).<br>Proceed as for fresh apple pie (114).<br>Cool thoroughly (136, 148). | Preparation:<br>Prepare as usual, bake in hot oven (450° F.) 15 minutes, reduce temperature to 350° and bake 35 minutes, cool thoroughly (114).<br>Filling:<br>Dip in cold thick sirup (75 percent sugar) with 800 mg. ascorbic acid per gallon added (67).<br>Dip apples in lemon juice (67).<br>Apples were not peeled (69).<br>Steam apple slices 1 1/2 minutes (105).<br>Crust:<br>No difference in pastry made by hot water and conventional methods after 4 months' storage. Conventional method preferred on short storage (105).<br>Vents were cut in top crust (67, 69). |
| | Packaging:<br>Use glass, tin, or paper pie plate, cover with second plate, heat-seal in cellophane or in metal foil, wrap in ordinary wrapping paper (114). | Packaging:<br>Wrap in cellophane, using drug-store fold; cover with stockinette (69).<br>Seal in waxed paper (67).<br>Wrap in cellophane after removing from tins (105).<br>Wrap in cellophane, heat-seal, freeze; next day remove from freezer, cover with paper pie plate, secure with tape, cover with stockinette. 2/<br>Storage:<br>Not more than 6 weeks. 2/<br>After 1 month, some browning of fruit dipped in lemon juice occurred (67).<br>After 3 months, some browning of fruit dipped in sirup occurred (67).<br>5 months at 0° F. (69).<br>6 months or more (114).<br>Undercrust was less soggy after 4 months' than after 1 month's storage (105).<br>Crust satisfactory for 6 months (67). |

See footnotes, page 95.

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:** | Thawing and heating: | Thawing and heating: |
| Apple-con.: | Unwrap, heat at 375° F. 30 minutes. 2/ | Unwrap, heat in moderate oven (325° to 350° F.) 30 to 40 minutes (136). |
| Baked before freezing-con. | | Bake in moderate oven (350° F.) 30 minutes (69). |
| | | Unwrap, leaving plate over top; heat at 425° F. 20 to 30 minutes (114). |
| | | Thaw in 425° F. oven (105). |
| | | Reheat (67). |
| Berry: | | |
| Unbaked---------- | | Better to freeze unbaked than baked pies (136). |
| | | This method was consistently satisfactory (110). |
| | Preparation: | Preparation: |
| | Do not cut openings in top crust (136). | Berries coated with sugar-flour mixture (110). |
| | | Raw pie shell frozen before filling (110). |
| | | Packaging: |
| | | Wrapped in cellophane within 24 hours after freezing (110). |
| | | Freezing temperature: |
| | | 3° to 7° F. (110). |
| | | Thawing and baking: |
| | | Baking time same for raw frozen as for fresh baked pies (50 minutes at 400° F. (110). |
| Baked before freezing-------- | | Baking before freezing recommended (148). |
| | Preparation: | Preparation: |
| | Cool, freeze immediately (110). | Coat berries with sugar-flour mixture (110, 123). |
| | | Blueberry and red raspberry pies baked 50 minutes (123). |
| | | Packaging: |
| | | Wrap pies in cellophane within 24 hours after freezing (110, 123). |
| | | Freezing temperature: |
| | | Baked pies freeze faster than raw pies (110, 123). |
| | | 3° to 7° F. (110). |
| | Thawing and heating: | Thawing and heating: |
| | Thaw in a 400° F. oven 20 minutes (110). | Blueberry pies were best thawed in the oven or at room temperature 6 hours (110, 123). |
| | | Raspberry pies were best thawed in the oven (110, 123). |
| | | Thawing 12 hours at room temperature was least satisfactory method (110, 123). |

See footnotes, page 95.

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:** | | |
| Cherry: | | |
| Unbaked --------- | | Pies had a crisp lower crust when frozen unbaked (110). |
| | Preparation: | Preparation: |
| | Prepare pie as usual; seal edges well but do not slit top crust (50). | Coat cherries with sugar-flour mixture. |
| | | Freeze shell before filling (110). |
| | Packaging: | Packaging: |
| | Leave pie in container in which it is to be baked; cover with paper plate, then wrap in moisture-vapor-proof material; heat-seal (50). | Wrap in cellophane within 24 hours after freezing (110). |
| | | Use paper pie plates with metal rims (50). |
| | | Thick paper plates are not satisfactory, leave undercrust raw and doughy (50). |
| | | Freezing temperature: |
| | | 3° to 7° F. (110). |
| | | Storage: |
| | | 2 to 6 months (50). |
| | Thawing and baking: | Thawing and baking: |
| | Remove wrappings, cut vent holes in upper crust, and bake without thawing at 400° F. 1 hour (50, 110). | Bake 15 to 20 minutes at 450° F., then about 30 minutes at 375° (50). |
| Baked before freezing ------- | Preparation: | Preparation: |
| | Prepare and bake as usual, cool, then freeze immediately (110). | Coat cherries with sugar-flour mixture (110, 123). |
| | | Bake in a 400° F. oven 60 minutes (110, 123). |
| | Packaging: | |
| | Wrap in cellophane within 24 hours after freezing (110, 123). | |
| | | Freezing temperature: |
| | | Baked pies freeze faster than unbaked pies (110, 123). |
| | | 3° to 7° F. (110). |
| | Thawing and heating: | Thawing and heating: |
| | Heat in oven (110, 123). | Heating in the oven produced a more crisp lower crust than thawing at room temperature (110, 123). |
| | | Thawing at room temperature for 6 hours was better than for 12 hours (110, 123). |
| Mince: | | |
| Unbaked ---------- | | Mince pies are better if baked before freezing (136). |
| | | Unbaked mince pies are better than prebaked. 2/ |
| | | Storage: |
| | | 2 months (109). |
| | | 6 to 10 months (50). |

See footnotes, page 95.

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:** | | Thawing and baking:<br>Pies baked without thawing were more tender and flaky and had better flavor than thawed pies.[2/] |
| Mince-con :<br>Unbaked-con. | | |
| Baked before freezing ------- | Mince pies freeze well (148).<br>Frozen unbaked mince pies are better than frozen prebaked.[2/] | |
| | Formula:<br>Use standard recipe.[2/] | Formula:<br>Fat to flour ratio: 1 to 4.[2/] |
| | Preparation:<br>Cool rapidly and thoroughly (43, 136, 148). | Preparation:<br>Bake at 425° or 450° reduced to 375° F.[2/] |
| | | Storage:<br>2 or more months at 0° F. or lower (43).<br>6 to 10 months (50). |
| | Thawing and heating:<br>Unwrap and heat at 375° F. 30 to 40 minutes.[2/] | Thawing and heating:<br>Unwrap and heat in moderate oven (325° to 350° F.) 30 to 40 minutes (136). |
| Peach: | | |
| Unbaked --------- | Unbaked pies are superior to those baked before freezing (67). | |
| | | Formula:<br>Hydrogenated cottonseed oil shortening was used (67).<br>Lard was better than vegetable shortening after 4 months' storage.[2/] |
| | Preparation:<br>Steam sliced fruit (50, 136).<br>1 or 2 minutes (136).<br>Do not cut steam vents in crust (67). | Preparation:<br>Dip slices for 1 minute in solution containing 1 teaspoon sodium bisulfite to 1 quart water, drain, let stand 1 hour before freezing (58).<br>Dip in sirup containing ascorbic acid or in lemon juice, as for apples (67).<br>Sprinkle lemon juice or ascorbic acid solution on the filling (50, 136).<br>Mix sugar and flour and sprinkle over the fruit (67). |
| | | Packaging:<br>Seal in waxed paper (67). |
| | | Storage:<br>1 month (109).<br>2 to 6 months (50).<br>Crust was satisfactory after 6 months at 0°F. Some browning occurred after 3 months in fruit coated in sirup; after 1 month in fruit dipped in lemon juice (67). |
| | Thawing and baking:<br>Cut vents in top crust and bake unthawed at 400° F. about 1 hour (50). | Thawing and baking:<br>Bake at 450° F. 15 to 20 minutes, then at 375° about 30 minutes (50). |

See footnotes, page 95.

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:** | | |
| Peach-con.: | | |
| Baked before freezing ------ | | Pies baked before freezing not as desirable as pies frozen unbaked (67). |
| | Formula: | Formula: |
| | Use standard recipe.[2/] | Lard and hydrogenated fat were used.[2/] |
| | | Hydrogenated cottonseed oil shortening used (67). |
| | | 3 to 1 ratio flour to fat.[2/] |
| | Preparation: | Preparation: |
| | Prepare as usual.[2/] | Mix sugar and flour and sprinkle over fruit (67). |
| | | Dip slices in cold, thick sirup (75 percent sugar) with 800 mg. ascorbic acid per gallon added (67). |
| | | Dip slices in lemon juice (67). |
| | | Sprinkle lemon juice over peaches.[2/] |
| | Packaging: | Packaging: |
| | Wrap in moisture-vapor-proof cellophane, heat-seal, freeze, then wrap in stockinette.[2/] | Seal in waxed paper (67). |
| | | Storage: |
| | | Some browning of fruit dipped in sirup occurred after 3 months (67). |
| | | Lemon juice preserved color and flavor for 1 month (67). |
| | | Crust was satisfactory after 6 months (67). |
| | | Thawing and heating: |
| | | Reheat (67). |
| | | Reheat at 375° F. 50 minutes.[2/] |
| Rhubarb: | | |
| Unbaked ---------- | | Storage: |
| | | 4 months (109). |
| Fruit, deep-dish: | | |
| Unbaked ---------- | Deep-dish pies prevent the most common cause of failure, soggy lower crust (50, 159). | |
| | Formula: | |
| | Use standard recipe for apple, peach, cherry, or other fruit pie (50). | |
| | | Preparation: |
| | | Cover fruit with pastry rolled 1/8 inch thick; pull pastry around edge of dish and keep it up from the fruit (50). |
| | | Packaging: |
| | | Pans deeper than standard piepans (50). |

See footnotes, page 95.

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:** | Thawing and baking: | |
| Fruit, deep-dish-con.: | Unwrap, prick top, bake without thawing, individual pies about 20 minutes at 450° F., large pies 15 to 20 minutes at 450°, then about 30 minutes at 375° (50). | |
| Unbaked-con. | | |
| Baked before freezing | Deep-dish pies prevent soggy undercrust, a common fault (43). | |
| | Formula: | Formula: |
| | Use standard recipe (43). | Fresh or frozen fruit is best (43). |
| | Packaging: | |
| | Wrap pie in baking tin in moisture-vapor-proof paper, place in paper carton (43). | |
| | | Freezing temperature: |
| | | 0° F. or lower (43). |
| | | Storage: |
| | | 2 or more months at 0° F. or lower (43). |
| Cream: | | |
| Unbaked | | Chocolate and other cream pies are not satisfactory; they become curdled, lumpy, watery when thawed (58). |
| | | Cream pies are unsatisfactory (136). |
| | | Cornstarch- and tapioca-thickened cream pies freeze well (148). |
| | | Chocolate and lemon pies are satisfactory (148). |
| | Formula: | |
| | Use standard recipes (58, 127, 148, 166). | |
| | Preparation: | |
| | Use standard procedures (58, 127, 148, 166). | |
| | Packaging: | Packaging: |
| | Place in special paper pie plates; seal in cellophane before freezing or immediately after (23). | Place in folding waxed cartons in paper "bake-a-pie" plates, overwrap with moistureproof cellophane, heat-seal (148). |
| | | Storage: |
| | | 6 to 8 weeks (148). |
| | Thawing and baking: | Thawing and baking: |
| | Remove from package and bake without thawing (23, 148). | Bake one-crust pies the same as fresh pies, but for a slightly longer time (50). |
| | | Baking time varies with thickness of pie (23). |
| Baked before freezing | Chocolate and lemon chiffon pies freeze successfully (1, 166). | Fillings shrink and change color (178). |
| | Meringue toppings tend to toughen, separate, and stick to the wrapping (1, 166). | |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:** | | |
| Cream-con.: | | |
| Baked before freezing-con. | Formula:<br>Use standard recipes (127, 148, 166, 178).<br>Preparation:<br>Use standard procedure (127, 148, 166, 178).<br>Cool to room temperature (1, 148, 166). | Formula:<br>Cornstarch- and tapioca-thickened pies freeze well (148). |
| | Packaging:<br>Pack in metal, glass, or special fiber pie plates, cover with another pie plate, and wrap in moistureproof material (1, 166). | Packaging:<br>Use closely fitted moistureproof wrappers (178).<br>Slip pie onto paper plate with a second plate inverted over the top, wrap in moistureproof cellophane, cover with stockinette (148).<br>Storage:<br>Many months (178).<br>4 to 6 months (148). |
| | Thawing and heating:<br>Cream and chiffon pies may be eaten when partially thawed--20 to 30 minutes--or completely thawed--about 45 minutes (166). | Thawing and heating:<br>Do not reheat (1, 166).<br>Thaw in wrappings at room temperature or in oven until just warm (148). |
| Custard: | | |
| Unbaked --------- | Frozen unbaked custard pie is not satisfactory (58, 136, 148, 166). | Custard pie became curdled, lumpy, and watery when thawed (58).<br>Custard pie may coagulate during freezing and storage (148). |
| Baked before freezing-------- | Not recommended (1, 166). | Custard may coagulate on freezing (148). |
| Pumpkin: | | |
| Unbaked --------- | Better to freeze pumpkin pie unbaked than baked (127, 136).<br>Formula:<br>Use varieties of pumpkin without coarse fibers (50).<br>Preparation:<br>Steam pumpkin until just soft enough to put through a sieve (50). | |
| Pumpkin, squash, sweetpotato: | | |
| Baked before freezing ------- | | Baked pies freeze well (1, 148).<br>Baked frozen pies not acceptable (43).<br>Storage:<br>Several months, provided pies are protected against drying out (179). |

PROCEDURES FOR HOME FREEZING OF BAKED GOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pies-con.:** Pumpkin, squash, sweetpotato-con.: Baked before freezing-con. | | Thawing and heating: Partially thaw 1 to 2 hours at room temperature, heat 10 to 15 minutes in 350° F. oven (1). Completely thaw at room temperature without reheating (1). |
| **Pastry:** | | |
| Unbaked and baked— | Baked and unbaked shells and graham cracker shells can be frozen satisfactorily (1). | |
| | Preparation: Roll out and fit dough into pie tins (138). | Preparation: Form in any convenient shape (130). Unrolled frozen dough takes a long time to thaw (138). Dough rolled flat and frozen is too brittle (138). |
| | Packaging: Wrap tightly in moisture-vapor-proof material, seal with heat or tape (130). | |
| | | Storage: Several weeks (130). |
| | | Thawing and baking: Bulk: Defrost overnight in refrigerator, or more quickly at room temperature, being careful not to let pastry become too warm (130). |
| **Pie fillings**--------- | Pumpkin, mincemeat, and sweetpotato pie mixes freeze well (148). | |
| | | Formula: Commercial mixes tested were not satisfactory (1). Cloves became stronger during storage (1, 166). |
| | | Preparation: Apple filling frozen raw preferred to prebaked filling (69). |
| | Packaging: Pack in frozen-food containers (1, 50, 166). | Packaging: Pack in glass jars (50). |
| | Thawing and baking: Partially thaw, add any extra ingredients, bake as usual, allowing extra baking time if not completely thawed (1, 166). | Thawing and baking: Thaw in refrigerator or at room temperature or in cool water, if packaged in watertight containers, until soft enough to transfer to pie shell; slightly longer baking time may be necessary (50). |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Meats, poultry, fish:** | | |
| Fried meats and poultry | Thawing and baking-con.:<br>Fried meats do not freeze well because they lose crispness and develop warmed-over flavor (50, 148, 166, 176, 178).<br>Preparation:<br>Cover with gravy or sauce to retard rancidity (166, 176, 178). | Preparation:<br>Cover with oil (176, 178). |
| Meat loaf and meat balls ------ | Formula:<br>Use standard recipes for ham loaf, beef loaf, liver loaf, and meat balls (50, 114, 159).<br>Preparation:<br>Use standard procedures; do not overcook (50, 114, 159). Cool quickly to room temperature, freeze immediately (114).<br>Packaging:<br>Pack in cartons with moisture-vapor-proof liners, heat-seal (114).<br>Storage;<br>6 months (114).<br>Thawing and heating:<br>Heat in top of double boiler or in casserole in the oven (50, 114, 159). | Formula:<br>Use ingredients of best quality (114).<br>Preparation:<br>Cook until barely tender and take from heat at once (114).<br>Loaves are best if covered with gravy (159).<br>Packaging:<br>Allow 1/4-inch head space for pints, 1/2-inch for quarts (114).<br>Storage:<br>Fat tends to become rancid (114).<br>Gradual loss of flavor, aroma, and texture (114).<br>Thawing and heating:<br>Meat balls:<br>Heat in double boiler for 45 minutes and stir occasionally (114).<br>Defrost overnight in refrigerator (114).<br>Thaw at room temperature until softened; then heat in saucepan (114).<br>Loaves:<br>Heat in covered saucepan (50). |
| Roast meats and poultry --------- | Formula:<br>Use standard recipes (19, 43, 148, 166).<br>Roast beef, pork, ham, chicken, turkey freeze satisfactorily (166).<br>Preparation:<br>Leave in large compact pieces whenever possible (19, 43, 159, 176).<br>If frozen in small pieces, cover with gravy or sauce to prevent stale flavor (50, 148, 166). | Formula:<br>Freeze all roasts with exception of pork products (148).<br>Freeze left-over meats (50, 148).<br>Preparation:<br>Remove bones and extra fat when possible (43). |

PROCEDURES FOR HOME FREEZING OF PREPARED AND COOKED FOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Meats, poultry, fish-con.:** Roast meats and poultry-con. | Packaging:<br>Frozen dry:<br>Pack in moisture-vapor-proof material, seal, and cover with stockinette (50).<br>Frozen in sauce:<br>Pack in tub-type cartons or glass jars (50).<br>Dressing:<br>Wrap separately in moisture-vapor-proof material (43, 50). | Packaging:<br>Pack compactly (43, 50).<br>Storage:<br>2 to 4 months (43).<br>6 to 9 months (50).<br>3 to 8 months (50).<br>Storage life of cooked pork and turkey is less than that of beef (166).<br>Outer slices of roast may have stale flavor (50). |
| | Thawing and heating:<br>Frozen dry:<br>Thaw quickly in sealed original package in refrigerator, at room temperature, or by setting container in water. Serve cold or reheat (50, 148).<br>Frozen in sauce:<br>Reheat meats packed in gravy in double boiler, in covered casserole, in steamer, or over direct heat (50, 159).<br>Dressing:<br>Place stuffing before completely thawed in greased casserole; add small amount of water, cover, and heat in 350° F. oven (50). | Thawing and heating:<br>Almost as much time is required to reheat frozen roasted poultry as to cook the raw bird; also dries out and skin becomes brown and tough (50). |
| Shrimp, cooked--- | Formula:<br>Pack dry, with cocktail sauce, or as shrimp creole (79). | Formula:<br>Salt increases development of rancidity but flavor flat without salt (89).<br>Rancidity in storage increased with greater concentration of salt (89).<br>Other seasonings had no effect on keeping quality (89). |
| | Preparation:<br>Boil unpeeled shrimp 10 to 20 minutes in a solution of 10 percent of their weight of salt (89, 166). | Preparation:<br>Remove head, cook with or without shell (79).<br>Boil in water containing salt and any seasoning desired for 8 to 10 minutes (79).<br>Boil peeled shrimp 8 minutes in 2 1/2- to 5-percent salt solution (89). |

PROCEDURES FOR HOME FREEZING OF PREPARED AND COOKED FOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Meats, poultry, fish-con.:** Shrimp, cooked-con. | Preparation-con.: Boil peeled shrimp 5 to 10 minutes in solution of 5 percent of their weight of salt (166). Cool and freeze promptly (166). Packaging: Use high wet-strength moisture-vapor-proof packaging materials (89). Storage: Store at 0° F.: Unpeeled boiled shrimp, 6 months (166). Peeled boiled shrimp, 3 months (166). Shrimp cocktail, 6 weeks (89, 166). Shrimp creole, 6 weeks (89, 166). | Packaging: Laminated wet-strength kraft-cellophane bag in BSLM high-gloss carton with laminated waxed paper overwrap (89). High wet-strength thermoplastic-coated bag with carton and overwrap (89). Laminated and overwaxed one-piece telescope carton with different overwraps (89). Laminated aluminum-foil bag gave slight metallic flavor to cooked shrimp, none to raw shrimp (89). Storage: Peeled and unpeeled, 3 months (89). Raw with shells on, 9 months (89). |
| **Combination dishes:** Creamed: General ------- | Formula: Freeze almost any type of creamed dish except those containing hard-cooked egg white (130). Preparation: Avoid overcooking (43). Cool rapidly in pan of ice water (43). Packaging: Use wide-mouth containers (43). | Formula: Use standard recipe with small amount of fat (43). Add 1/4 teaspoon gelatin per quart sauce before cooking (43). Add potatoes upon reheating (130). Omit skim milk, eggs, and cheese (178). Creamed dishes rich in fat become rancid (58). All sauces tend to curdle and lump after thawing and reheating (58, 172). Solid pack or puree of "runny" or semifluid style most desirable (178). Preparation: Sauces containing eggs should not be heated above 150° F. or eggs will cause curdling (178). Packaging: Place food in layers with double thickness of cellophane (43). Storage: 2 to 4 months (43). |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Combination dishes-con.:** | | |
| Creamed-con.: | | |
| Chicken---------- | Formula:<br>Cooked chicken and white sauce (84).<br><br>Preparation:<br>Prepare as usual (84).<br>Avoid overcooking (43).<br>Cool rapidly by setting pan of hot food in ice water (43, 84).<br>Packaging:<br>Pack in freezer cartons with moisture-vapor-proof liners, heat-seal (84).<br>Wide-mouth containers are best (43).<br><br>Storage:<br>12 months (84).<br><br>Thawing and heating:<br>Put frozen block in double boiler over warm water, bring water to boil, and heat 30 minutes (84). | Formula:<br>Use standard recipes with small amount of fat (43).<br>Add 1/4 teaspoon gelatin per quart to sauce before cooking to prevent separation (43).<br><br>Packaging:<br>Use paperboard containers with heat-sealing MSAT 300 cellophane liners (84).<br>Place food in containers in layers, using double thickness of cellophane to help separate food for reheating (43).<br>Freezing temperature:<br>0° F. or lower (43, 84).<br>-40° F. for 2 hours (9).<br>Storage:<br>Store at 0° F. 2 to 4 months (43).<br>Kept indefinitely at 0° F. (9). |
| Chicken à la king ---------- | Formula:<br>Cooked chicken, white sauce, green pepper, mushrooms, pimiento, seasoning (84).<br><br>Preparation:<br>Simmer chicken until tender. Cook mushrooms and green pepper in fat 5 minutes, add flour, liquid, and seasonings. When thickened add chicken (84).<br>Cool quickly by placing pan of hot food in ice water (84).<br>Package and freeze immediately (84 114).<br>Packaging:<br>Use cartons with moisture-vapor-proof cellophane liners; heat-seal (84, 114). | Formula:<br>Use ingredients of best quality (114).<br>Mushrooms may cause off-flavor (84).<br>Green pepper and pimiento lose flavor on long storage (166).<br>Preparation:<br>Prepare in usual way but shorten cooking time; cook chicken until heated through and barely tender (114).<br><br>Packaging:<br>Use pint paperboard containers with heat-sealing MSAT 300 cellophane liners (84).<br>Leave 1/4-inch head space for pints, 1/2-inch for quarts (114). |

PROCEDURES FOR HOME FREEZING OF PREPARED AND COOKED FOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Combination dishes-con.:** | | |
| Chicken à la king-con. | Freezing: | Freezing: |
| | Freeze at 0° F. in air circulated with fan (84). | 12 hours are required for temperature of food to reach 0° F. (84). |
| | Storage: | Storage: |
| | 12 months (84). | 3 months (166). |
| | | 6 months (114). |
| | Thawing and heating: | Thawing and heating: |
| | Put frozen block in double boiler over warm water; bring water to a boil and heat 30 minutes (84). | Heat for 45 minutes in double boiler, stir only enough to prevent sticking (114). |
| Fish dishes ----- | Formula: | Formula: |
| | Use standard recipes (111). | Hard-cooked eggs become progressively tougher on storage (111). |
| | Fish à la king, fish in cheese sauce, fish and rice, fish hash, clam fritters, fish chowder, fish in creole sauce (111). | Sliced olives or pickles may be used (111). |
| | | Potatoes best if added upon thawing (130). |
| | Newburg thermidor (176). | Avoid sauces rich in fat, because fat becomes rancid (58). |
| | Preparation: | Preparation: |
| | Prepare food as if it were to be served immediately (111). | Clam fritters: Prepare fritter mix with cooked clams, since raw ones do not freeze well (111). |
| | | Sauces containing egg should not be heated above 160° F. to prevent curdling (176). |
| | | Eggs may be added when sauce is thawed and heated (176). |
| | Packaging: | |
| | Use lightly waxed fiberboard containers with heat-sealing moisture-vapor-proof cellophane liners (111). | |
| | Storage: | |
| | Store at 10° F. (111): | |
| | Fish à la king, 8 months. | |
| | Fish chowder, 5 months. | |
| | Creamed fish, 5 months. | |
| | Fish and rice, 8 months. | |
| | Fish hash, 5 months. | |
| | Thawing and heating: | Thawing and heating: |
| | Heat and serve (111). | Prethawing recommended, but many products may be heated from the frozen state (111). |
| Beef, veal, and Brunswick stews-- | Formula: | Formula: |
| | Use standard recipes for beef, veal, and Brunswick stews (114, 159). | Avoid rice (114). |
| | | Select vegetables that freeze well (carrots, celery, soybeans) (159). |
| | Use ingredients of highest quality (114, 124). | Avoid potatoes, green peppers, and garlic (58). |
| | | If milk is part of the recipe, omit until reheated for serving. Do not add potatoes and do not thicken gravy before freezing (166). |

PROCEDURES FOR HOME FREEZING OF PREPARED AND COOKED FOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Combination dishes-con.: Beef, veal, and Brunswick stews-con. | Preparation: Prepare foods in usual way, but shorten cooking time for most of them (114). Package when stew reaches room temperature (114). | Preparation: Beef stew (124): Beef shank or shoulder meat may be used; remove gristle and other inedible tissue, and cut meat into 1-inch pieces. Do not dredge meat in flour. Braise meat at low heat without addition of liquid, until enough broth is produced nearly to cover meat. Then add liquid to increase gravy. Cook vegetables separately in meat gravy. Brunswick stew (128): Cook liver until tender, discard broth. Boil other meat until it falls from bones, remove bones and gristle, and chop or grind meat. Strain broth and cook for 1 hour with finely chopped tomatoes and onion. Add cooked mashed potatoes, corn, catsup, seasoning, and meat. Cook for 1 hour, stirring well. |
| | Packaging: Use frozen-food containers (114, 124, 128). | Packaging: 1-pound containers (124). Tightly folded aluminum foil bags (128). Cellophane-lined cartons, heat-sealed (114, 128). |
| | Storage: 6 months (114). | Storage: Store at -10° to 0° F. (128). |
| | Thawing and heating: Thaw in casserole in oven or in top of double boiler (159). Use reheated foods at current meal; holding and reheating not recommended (114). | Thawing and heating: Heat 45 minutes in double boiler, or defrost overnight in refrigerator or for several hours at room temperature. Then heat in a little butter or bacon fat. Stir only to prevent sticking (114). Thaw in package, or thaw quickly over boiling water (128). |
| Soups ---------- | Formula: Use standard recipes of practically any kind (130, 166). Recommended: Split pea (50, 148). Navy bean (50, 148). Cream of corn (50). French onion (50). Cream of noodle (50). Asparagus puree (148). Meat stock (159). Black bean (50). | Formula: Soups made from purees good (50, 159). Freeze concentrated base only (159). Omit milk until reheated for serving (166). Pieces of onion and carrot better than potatoes (50). Add potatoes and seasonings when reheating (159, 166). |
| | Preparation: After soup is prepared by standard methods, cool quickly (130, 148) by placing pan in cold water (130). | Preparation: After preparing vegetables, reheat without stirring in double boiler to drive out air (50). Add liquid to concentrated base at time of thawing (159). |

PROCEDURES FOR HOME FREEZING OF PREPARED AND COOKED FOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Soups-con. | Packaging:<br>Use watertight, moisture-vapor-proof containers (148).<br>Storage:<br>6 months (148).<br>Thawing and heating:<br>Thaw cream soups in double boiler, clear soups in saucepan. Heat to serving temperature (130). | Packaging:<br>Use sturdy packages, friction-top, tub-type cartons, and glass jars (50).<br>Fill pint containers to 1/2 inch of top, quarts to 3/4 inch of top (130).<br>Use vegetable parchment bags placed in cartons (131).<br>Storage:<br>Several months (130).<br>6 months (131).<br>Thawing and heating:<br>Thaw at room temperature or in refrigerator (50).<br>Heat solidly frozen soup in double boiler, stirring often (50).<br>Thaw directly over heat (148, 159).<br>Heat in parchment bags in boiling water (131). |
| **Vegetables:** | | |
| General | As a rule cooked vegetables lose color, aroma, and flavor, and taste somewhat like warmed-over vegetables (19).<br>Formula:<br>Avoid using root vegetables that have been stored for some time (50).<br>Preparation:<br>Boil in very small amounts of water, or steam; keep covered and cook short time (50).<br>Cool quickly to room temperature before packaging. Set in pan of ice water or place in front of fan (50).<br>Packaging:<br>Pack in tub containers, jars, or heat-sealing cellophane-lined cartons (50). | Preparation:<br>It is not necessary to cook vegetables completely before freezing; vegetables heated longer than just enough to heat them through gradually lose their color, aroma, and flavor (50). |
| Beans, baked | Formula:<br>Use standard recipes (50, 99, 114, 166). | Formula:<br>Pectin added to prevent curdling when thawed (133, 150).<br>Cornstarch added as thickening agent (133, 150).<br>Variety of bean:<br>Small whites (133, 150).<br>Some varieties become mushy on cooking and freezing (50). |

PROCEDURES FOR HOME FREEZING OF PREPARED AND COOKED FOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Vegetables-con.: | | |
| Beans, baked-con. | | Formula-con.: |
| | | Proportions: |
| | | 48 percent cooked beans by weight (133, 150, 152). |
| | | 52 percent sauce by weight (133, 150, 152). |
| | | 1/2 ounce pork (150, 152). |
| | | Meat: |
| | | Must be excellent quality to keep as long as beans and sauce (50, 150). |
| | Preparation: | Preparation: |
| | Prepare beans in the usual way, cook until barely tender (114). | Parts of mixture should be cooked separately (150). |
| | Add pork, mustard, molasses, sugar, salt, and water. Bake 6 to 8 hours at 250° F. Chill quickly (50). | Beans: |
| | | Blanch 4 minutes at 170° F., soak in cold water for 16 hours, drain, and cook (150). |
| | | Cook 50 minutes in wire baskets at 15 pounds pressure (133, 150). |
| | | Do not overcook beans (114, 150). |
| | | Sauce: |
| | | Tomato puree, sugar, salt, fresh ground onions, cornstarch, citrus pectin, allspice, cinnamon, whole cloves, mace, fat, water (150). |
| | | Meat: |
| | | Cut into 1/2 ounce pieces and cook in covered tray (133). |
| | | Cook 30 minutes at 15 pounds pressure (133, 150). |
| | | Cook the pork with the beans (50). |
| | | Remove salt pork and onions before packaging (114). |
| | Packaging: | Packaging: |
| | Pack in moisture-vapor-proof cartons (99, 114, 133). | Fill each container with 48 percent beans, 52 percent sauce, and 1/2 ounce pork (150, 152). |
| | | Leave 1/4-inch head space for pints, 1/2-inch for quarts (114). |
| | | Bake and cool in glass or pottery casseroles or in sturdy paper baking dishes, cover, wrap in cellophane, and heat-seal (50). |
| | | Pack in small earthenware crock covered with waxed paper (166). |
| | | Place layer of cellophane between layers (48). |
| | Storage: | Storage: |
| | 6 months (114). | Store at 9° F. or lower (150). |
| | | Some fats tend to become rancid; there is gradual loss of flavor, aroma, and natural texture (114). |

PROCEDURES FOR HOME FREEZING OF PREPARED AND COOKED FOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Vegetables-con.:** | | |
| Beans, baked-con. | Thawing and heating:<br>Partially thaw at room temperature in package to prevent overcooking (50, 133, 150, 152).<br>Heat to serving temperature in casserole or double boiler (50, 150, 152). | Thawing and heating:<br>Heat in double boiler 45 minutes (114).<br>Use reheated food at current meal; further holding and reheating not recommended (114). |
| Potatoes, scalloped ------ | | Formula:<br>Add slightly more liquid to prevent drying out (50). |
| Potatoes, french-fried --- | Formula:<br>Use standard recipe (130).<br>Select potatoes suitable for french-frying. 2/<br>Preparation:<br>Fry in deep fat to light golden brown. 2/<br>Drain thoroughly on absorbent paper 2/ (130).<br>Cool to room temperature 2/ (130).<br>Packaging:<br>Pack in moisture-vapor-proof frozen-food containers. 2/<br>Thawing and heating:<br>Remove from package, place on baking sheet, reheat in hot oven (400° F.) 5 minutes. 2/ | Packaging:<br>Pack closely, fold moisture-vapor-proof liner around food, heat-seal (130).<br>Thawing and heating:<br>Remove from package, place on baking sheet, reheat in hot oven (400° F.) 15 to 25 minutes (130).<br>Reheat in heavy frying pan over low heat, turning frequently (130). |
| Potatoes, mashed- | Formula:<br>Use standard recipe (50). | Preparation:<br>Do not beat air into the potatoes (50).<br>Thawing and heating:<br>Heat in double boiler, add hot milk and seasonings (50). |
| Succotash ------ | Formula:<br>Use either lima beans or mature, but not dry, shell beans (50).<br>Use equal proportions of beans and corn (50).<br>Preparation:<br>Corn: Remove the husks and silk, boil corn in salted water for 10 to 12 minutes in covered pan, or steam it. Cut kernels from cob (50). | |

See footnotes, page 95.

PROCEDURES FOR HOME FREEZING OF PREPARED AND COOKED FOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Vegetables-con.:** | Preparation-con.: | |
| Succotash-con. | Beans: Shell beans, cook in salted water to cover in covered pan until just tender (50). | |
| | Combine equal amounts of corn and beans with cooking liquors, and chill mixture rapidly (50). | |
| | Thawing and heating: | |
| | Heat with or without partial thawing in covered saucepan over low heat (50). | |
| Sweetpotatoes, candied | | Formula: |
| | | White sugar will give a brighter color (168). |
| | | Brown sugar may be preferred for flavor (168). |
| | Preparation: | Preparation: |
| | Bake in oven or boil potatoes until soft. Cool, peel, slice, and dip in solution of 1 part lemon juice diluted with 8 parts water. Drain, roll in sugar (79, 168). | Steam under 10 pounds pressure for 10 minutes (168). |
| | Packaging: | |
| | Pack in airtight containers; seal (168). | |
| | | Storage: |
| | | Store at 0° F. or lower (168). |
| Sweetpotato puffs- | Formula: | |
| | Use standard recipe (50). | |
| | | Thawing and heating: |
| | | Remove from cartons without thawing, place on cooky sheet, bake 25 to 35 minutes in 350° to 400° F. oven (50). |
| Vegetable purees: | | |
| General | Formula: | Formula: |
| | Recommended: | Must be good quality to begin with (176, 178). |
| | Asparagus (63, 148, 159 176, 178). | Treat with lemon juice or ascorbic acid to prevent darkening (159). |
| | Beans, green (63, 159, 176, 178). | |
| | Beans, lima (176, 178). | |
| | Beets (63, 159, 176, 178). | |
| | Carrots (63, 65, 148, 159, 176, 178). | |
| | Peas (50, 63, 148, 159, 176, 178). | |
| | Spinach (63, 148, 159, 176, 178). | |
| | Squash (50, 63, 65, 159, 176, 178). | |
| | Sweetpotatoes (50, 159, 176, 178). | |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Vegetables-con.:** | Preparation: | Preparation: |
| Vegetable purees-con.: | Cooking time: | Cook in water in preference to steam, but keep vessel closed (176). |
| General-con. | Asparagus, 8 to 10 minutes (63). | Long steaming periods tend to cause more separation after thawing (153). |
| | Asparagus tips, 4 minutes (65). | Cleaned, steam-blanched, and precooked vegetables pureed by passing through a small Ritz disintegrator fitted with a a screen having perforations 0.04 inch in diameter (63, 65). |
| | Beans, green, 20 minutes (63). | |
| | Beets, 45 minutes (63). | |
| | Carrots (quartered) 20 minutes (63, 65). | |
| | Peas, 8 to 10 minutes (63, 65). | |
| | Spinach, 8 to 10 minutes (63, 65). | |
| | Squash, 20 minutes (63). | |
| | Squash, 30 to 40 minutes (153). | |
| | Cool, puree, and freeze (153). | |
| | Packaging: | Packaging: |
| | Use rigid moisture-vapor-proof containers (50, 63, 65, 176, 178). | Rigid leakproof, moistureproof containers (176, 178). |
| | Pack solid without bubbles or air spaces (159, 176, 178). | 4-ounce wide-mouth, crown-sealed, glass jars (63, 65). |
| | | Tub containers (50). |
| | | Heat-sealing cellophane-lined cartons (50). |
| | | Place two pieces cellophane every inch or so throughout package to permit separating sections (50). |
| | Storage: | Storage: |
| | 1 year (65, 176, 178). | Store at 0° F. (63, 65, 153). |
| | | 6 to 9 months (50). |
| | Thawing and heating: | Thawing and heating: |
| | Thaw at room temperature or in the refrigerator. Heat for serving (159). | Thaw puree as it is heated for serving (159). Thaw squash puree in double boiler (50). |
| Squash puree ---- | Formula: | Formula: |
| | Use only well-matured squash of "dry" types that show little tendency to flow when cooked and pulped (168). | Pie filling may be made by adding all ingredients except milk (168). |
| | | Treat with lemon juice or ascorbic acid to prevent darkening (159). |
| | | Recommended varieties: |
| | | Buttercup, Greengold, Golden Delicious, Golden Hubbard, and blend of Greengold and Hubbard (168). |
| | Preparation, Packaging, and Storage: | |
| | Same as for Vegetable Purees. | |
| | Thawing and heating: | Thawing and heating: |
| | Thaw at room temperature or in the refrigerator or as heated for serving (159). | Thaw in double boiler (50). |
| | | Thaw, transfer to casserole, bake in 400° F. oven (50). |
| | | Seasoning added after thawing (50, 178). |

PROCEDURES FOR HOME FREEZING OF PREPARED AND COOKED FOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Salads:** | | |
| Fruit | Formula:<br>Recommended:<br>Combine citrus fruits with non-acid fruits to prevent darkening (50).<br>Not recommended:<br>Raw grapes become flabby (50).<br>Raw apples become pithy (50).<br>Nuts discolor and become bitter (50).<br>Crisp foods lose crispness (159).<br>Mayonnaise curdles (50, 159). | Preparation:<br>Omit salad dressing until time of serving (50). |
| | Packaging:<br>Pack in waxed tubular containers with friction top (50). | |
| | Thawing:<br>Thaw in sealed original containers (50). | Thawing:<br>Allow to mellow in refrigerator (159). |
| Meat and poultry | Formula:<br>Cooked meats and poultry (50). | Formula:<br>Whites of hard-cooked eggs not recommended because they toughen (50). |
| | Preparation:<br>Cook, freeze, thaw; cut up and mix with other salad ingredients at serving time (50). | |
| | Packaging:<br>Pack in moistureproof containers (50). | Packaging:<br>Make a solid pack (50). |
| Vegetable | Formula:<br>Few vegetable salads are suitable for freezing (50). | Formula:<br>Raw vegetables lose crispness, flavor, and color (50). |
| **Sandwiches and sandwich fillings** | Formula:<br>Recommended:<br>Cheese (1, 50).<br>Hard-cooked egg yolk (1, 50, 130, 159).<br>Sliced meats or poultry (50, 130).<br>Ground meat or poultry (50).<br>Tuna or salmon (1, 50).<br>Nut pastes (159).<br>Peanut butter (1).<br>Olives, pickles (1). | Formula:<br>Day-old bread better than fresh bread (130). |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Sandwiches and sandwich fillings-con. | Formula-con.:<br>Not recommended:<br>Lettuce, celery, tomatoes, cucumber, watercress lose crispness, color, flavor (1, 50, 136, 159).<br>Whites of hard-cooked eggs become tough (1, 50, 130, 136, 159).<br>Fruit jellies soak into bread (1, 50, 136).<br>Fruit jellies soak into bread unless spread with butter (130).<br>Mayonnaise separates on freezing (1, 130, 136).<br>Preparation:<br>Freeze filling or complete sandwich (159).<br>Packaging:<br>Wrap in double thickness of heavy waxed paper for 1 week's storage; in moisture-vapor-proof material for more than 1 week's storage. Fold wrapping material tightly with drug-store fold (130).<br>Storage:<br>2 weeks (1, 130, 136).<br>Thawing:<br>Thaw at room temperature about 3 hours (1, 50, 136). | Preparation:<br>Spread with butter (136).<br>Packaging:<br>Moisture-vapor-proof cellophane (136).<br>Locker wrapping materials (1).<br>Aluminum foil, pliofilm, or cellophane (130).<br>Pack in box to prevent crushing (136).<br>Storage:<br>2 to 3 weeks (1).<br>Thawing:<br>Thaw at room temperature (159):<br>2 to 4 hours (19).<br>3 to 3 1/2 hours (50).<br>3 to 4 hours (1).<br>If to be toasted, start while partially frozen (159). |
| Fruit:<br>Baked apples----- | Formula:<br>Varieties recommended:<br>Cortland (86).<br>Rome Beauty [2] (86).<br>Baldwin (86, 120).<br>Red Twenty-ounce (86).<br>Northern Spy (86, 120).<br>Twenty-ounce (86).<br>Stayman Winesap.[2]<br>Added ingredients:<br>Sugar, cinnamon [2] (86, 120). | Prebaked frozen Rome Beauty and Stayman apples held at 0° F. for 1 month rated higher than or as high as freshly baked apples that had been stored at 34° for 1 month (129).<br>Formula:<br>$CaCl_2$ (0.05 or 0.10 percent concentration) added to McIntosh apples helped to retain shape and firmness (120).<br>Baldwin and Northern Spy apples retained shape and texture without $CaCl_2$ (120).<br>Added ingredients:<br>Sugar, cinnamon, water sirup. [2]<br>Brown sugar, pure maple sirup, or white sugar and mixture of nutmeg and lemon juice (86).<br>Corn sirup (145). |

See footnotes, page 95.

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Fruit-con.:** | | |
| Baked apples-con. | Preparation: | Preparation: |
| | Remove core and score around middle of apple, fill core cavity with desired ingredients, bake. [2] | Cored: |
| | Cool quickly (86, 145). | Core cut out from stem end, leaving blossom end (86, 120). |
| | | Skin peeled off top of apple (86). |
| | | Skin cut off around outside of apple (145). |
| | | Bake 35 minutes, covered with cold 30-percent sugar sirup (120). |
| | | Bake 40 to 60 minutes at 350° F., baste (145). |
| | | Bake covered at 400° F. for 25 minutes, then uncovered for 20 minutes. [2] |
| | | Bake at 400° F. until soft (86). |
| | | Vacuumized: |
| | | Apples immersed in 30-percent sugar sirup, vacuumized (24 to 28 inches vacuum) for 15 minutes, then baked (120). |
| | | Glazed: |
| | | Apples held in boiling 50-percent sugar sirup 6 minutes, baked at 350° F. for 25 minutes, sirup added (120). |
| | | Packed with and without sirup. [2] |
| | Packaging: | Packaging: |
| | Use quart tub-shaped cups, bottoms lined with cellophane, three apples per container, each covered with two layers of cellophane, covered with lid (86). | Lily-tulip cups. [2] |
| | | Vapo-seal waxed paperboard cartons. [2] |
| | | Fruit-enameled cans, sealed (120). |
| | | Moistureproof cellophane (145). |
| | | Freezing temperature: |
| | | -6° F. (86). |
| | | -10° F. (120). |
| | | -40° F. (129). |
| | | Storage: |
| | | 1 month at 0° F. (129). |
| | | 6 months at -6° F. (86). |
| | Thawing and heating: | Thawing and heating: |
| | Reheat in 300° F. preheated oven (145). | Thaw at room temperature overnight, reheat for 10 minutes in 350° F. oven (120). |
| Cranberry sauce --- | Preparation: | |
| | Cook whole cranberry sauce, and package (130). | |
| **Pudding:** | | |
| Steamed ---------- | Formula: | Formula: |
| | Use standard recipes (136). | Use fresh spices (136). |
| | Preparation: | |
| | Cool quickly (136). | |
| | Packaging: | |
| | Pack in moisture-vapor-proof paper or containers (136). | |

See footnotes, page 95.

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| **Pudding-con.:** | | |
| Steamed-con. | Thawing and heating:<br>Place while frozen, or after thawing at room temperature, in a steamer; heat to serving temperature (136). | |
| Sauces ---------- | | Packaging:<br>Use round containers (136).<br>Thawing:<br>Thaw at room temperature until soft, stir (136). |
| **Velva Fruit** -------- | It is better to make and store fruit puree for making into Velva Fruit at a later time (157).<br>Formula:<br>Recommended fruits:<br>Apricots (156, 157).<br>Cantaloups (157).<br>Cranberries (157).<br>Grapes (Concord) (157).<br>Nectarines (156, 157).<br>Peaches (156, 157).<br>Plums (156).<br>Prunes (156).<br>Raspberries (91, 156, 157).<br>Rhubarb (157).<br>Strawberries (90, 157).<br>Recipe (157):<br>6 cups fruit puree<br>1 1/2 to 2 cups sugar<br>2 tablespoons lemon juice (omit for acid fruits)<br>1/4 teaspoon salt<br>2 tablespoons granulated gelatin<br>1/2 cup water. | Formula:<br>Addition of lemon juice improves flavor of less acid fruits, but omit for acid fruits (157).<br>Fruit puree should be cool (70° F.) when added to gelatin; if too cold the gelatin will congeal, if too warm the mixture will expand too much when whipped in freezer (157).<br>Added stabilizer must produce overrun of about 100 percent with small compact air cells to insure smooth-textured product; 275 Bloom gelatin is satisfactory (91, 155, 156).<br>Peach and apricot purees are dry and grainy when too much overrun produced; 80- to 90-percent overrun is satisfactory. For highly flavored plum and berry puree, 100- to 110-percent overrun is recommended (156).<br>Fruit mix need not be aged but certain amount of delay desirable to permit complete hydration of gelatin (156).<br>Satisfactory overrun (100-percent) attained in 1 gallon freezer only 5 to 10 minutes after addition of gelatin (156).<br>Sugars (155, 156):<br>Corn sirup makes dessert stiffer, more melt resistant, with more body than sugar does.<br>Sirup used with berries, since they are thinner and can use stiffening properties.<br>Dextrose does not give extra stiffening; use with fruits high in pectin as apricots, peaches, prunes, and nectarines. |

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Velva Fruit-con.-- | Preparation:<br>Make fruit puree; mix with sugar.<br>Freeze as puree or make into Velva Fruit (157).<br>For Velva Fruit:<br>Add lemon juice and salt, add cool puree (70° F.) to soaked gelatin, stirring continuously.<br>Packaging:<br>Pack at once in moisture-vapor-resistant cartons (157).<br>Fruit puree can be packaged in glass jars or tin cans (R-enamel cans for red or dark purees) (157).<br>Storage:<br>Can be stored several months, but flavor and texture best a few days after freezing (157).<br>Thawing:<br>Thawing puree to make Velva Fruit:<br>Place sealed container in cold or lukewarm (not hot) water, shake occasionally to speed thawing. A quart of puree will thaw in about 2 hours (157). | Packaging:<br>Waxed paper cups (90).<br>Thawing:<br>From refrigerator:<br>Pour into a chilled bowl, and beat with a wooden spoon or electric mixer until mixture lightens in color, increases in volume, and has a smooth texture (157). |
| Meals, precooked -- | Choose foods that can be successfully reheated after freezer storage, will heat uniformly, and have about the same storage life (51).<br>Formula:<br>Typical menus 3/ (101).<br>(1) Steak, french-fried potatoes, peas.<br>(2) Beef stew, hot bread, asparagus.<br>(3) Meat loaf, candied sweet-potatoes, spinach.<br>(4) Corned-beef-hash patties, home-fried potatoes, string beans. | Successful garnishes (51):<br>Cold:<br>Cranberry sauce.<br>Red cinnamon pears.<br>Applesauce.<br>Prunes stuffed with cream cheese.<br>Cherries stuffed with cream cheese.<br>Hot:<br>Spiced pears.<br>Peach halves stuffed with brown sugar and butter.<br>Spiced sour cherries. |

See footnotes, page 95.

PROCEDURES FOR HOME FREEZING OF PREPARED AND COOKED FOODS--continued

| Food | Procedures considered most applicable to home freezing | Other procedures noted from the literature review |
|---|---|---|
| Meals, precooked--con. | Formula-con.:<br>(5) Ham steak, candied sweetpotatoes, turnips.<br>(6) Breaded veal cutlet, homefried potatoes, carrots.<br>Food proved to be attractive as well as palatable. 3/<br>Preparation:<br>All foods partially precooked (11, 101).<br>Packaging:<br>Use special cardboard package enclosed in cellophane (102).<br>Pack solid to eliminate air (51).<br>Storage:<br>Use before food with shortest storage life loses quality (51).<br>Thawing and heating:<br>Rate of heat penetration depends on nature of food, amount, and shape (51).<br>Protein foods heat slowly (51).<br>Mashed vegetables heat more slowly than loose vegetables (51).<br>Meat and poultry tend to dry out unless covered with gravy or sauce (51).<br>Gravies tend to separate during thawing; to prevent separation, add raw starch to chilled gravy and mix (51).<br>Cover with metal foil some foods that tend to dry out during reheating (51). | Packaging:<br>Throw-away-type plate: Ordinary pulp plate treated with phenolic resin plastic coating on side which holds food; paper disc placed over filled plate and held in place with collar of transparent cellulose acetate 3/ (101).<br>Partitioned paper plate made nonabsorbent by being treated with a harmless colorless lacquer, or platter treated with specially treated cellophane, and heat applied to rim of plate to make cellophane adhere (11).<br>Storage:<br>Store at -30° F. (11).<br>Thawing and heating:<br>Preferably in specially developed oven that cooks in 15 minutes. Regular range requires 45 minutes 3/ (101).<br>Raytheon, Inc., electronic range (Radarange) heats food to serving temperature in less than 1 minute. 3/<br>Food uniformly cooked in Fro-Hot oven the remainder of the time required to make it a perfect meal (11).<br>Heat for 25 minutes in a 400° F. oven (102).<br>An aluminum sheet above the meal is adjusted so that its ends project over the long sides during cooking in the plate (102). |

1/ Numbers in parentheses refer to Literature Cited, page 96.

2/ Unpublished data. United States Bureau of Human Nutrition and Home Economics.

3/ UNITED STATES AIR FORCE, AIR MATERIEL COMMAND, ENGINEERING DIVISION. PRE-COOKED FOODS. (Memorandum.) PB 93531, 13 pp. 1948. (Available from Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C., photostatic copy, $2.50, microfilm, $1.75. Make check or money order payable to Librarian of Congress.)

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